Excavating Engineer

founded 1905

MAY 1960

Working on the Transwestern pipeline near Roswell, N. M., pipelayers owned by Houston Contracting Co. lower in a section of 30-in. pipe. A series of features about the project begins on page 6.

H-3 series two Hydrocrane® crane-excavator with new three-piece boom

Now you can combine the oil-smooth operating advantages of the HYDROCRANE hydraulic crane with the extra reach and strength of a new three-piece alloy steel boom.

IT GOES TO ANY LENGTH TO DO A JOB

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Excavating Engineer

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South Milwaukee, Wisconsin

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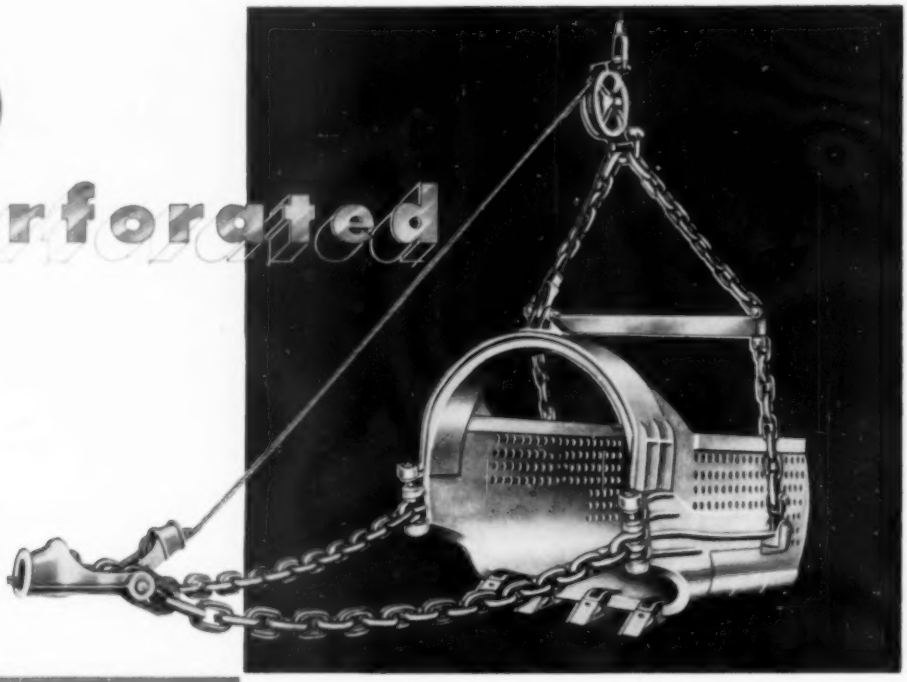

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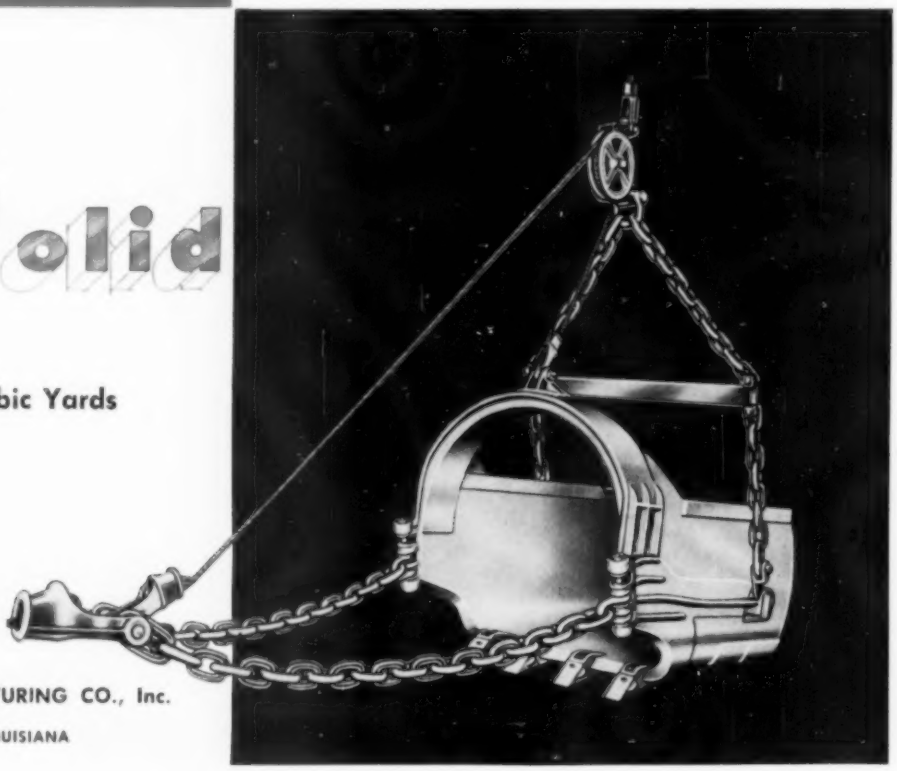

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LW Rear-Dumps position fast . . . usually spot under shovel in one continuous motion, with little "jockeying". Wide, unobstructed top opening gives your shovel-operator easy "target". Low rear entry speeds dipper swing, reduces spillage.

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Rough haul roads, uneven terrain, sticky mud . . . no problem for LW Rear-Dumps! Wide, low-pressure tires, famous LW power-transfer differential, balanced weight distribution, electric-steer, all help provide go-anywhere traction.

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Electric motor raises tapered bowl fast and material dumps quickly. End of bowl extends beyond rear wheels for clean over-bank dumping. Electric controls permit fast dump or controlled spread. Front-wheel-drive permits easy pull-out.

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Repair bills are lower, daily lube time is shorter, because LW Rear-Dumps eliminate such troublemakers as springs, long drive-shaft, universal joints, tie-rods, small steer-wheels, and frame.

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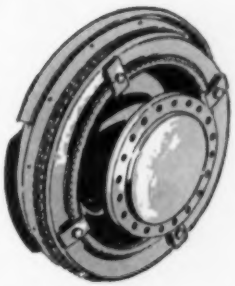
Production stays high all day-long because many fatigue-factors are reduced. Big tires, big foam-cushion seat, smooth out ride for operator. Fingertip electric-switches give speed-of-light control with little effort.



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Multi-disc air brakes provide more brake surface per wheel than most haulers have on four wheels. Low center of gravity, excellent visibility, front-wheel-drive, and easy control . . . all increase safety.

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It travels faster ...works faster

For your *own* satisfaction, determine the money-saving advantages you get with a big LeTourneau-Westinghouse Tournatractor. Do some stop-watch-timing on this tractor and compare its performance with any tractors you may *now* own.

You'll find, if assigned to clean-up duty around a number of scattered shovels for instance, that a track-type tractor spends much of its time just traveling between jobs. And travel time accomplishes *nothing*. It only adds to your operating costs. Or, if you assign one tractor to *each* shovel, you'll notice that here, too, there's liable to be a lot of waste time, because there isn't enough work to *keep one tractor busy*.

Fast work and travel speeds offer a big advantage

With Tournatractor, you cut tractor "travel overhead" by more than half. That's because, on job-to-job travel, Tournatractor moves more than twice as fast as the fastest crawler tractor. It runs between assignments . . . at speeds to 17 mph! You'll find a single rubber-tired LW tractor handles more work over a wider area than *2 or more crawler tractors!*

And because Tournatractor is fast, don't get the idea it's just a "hit-and-run" flyweight. Not on your life! It's got the sock and ruggedness of a true "heavy". With 218 hp and up to 15 tons of work-weight, it can match production with any tractor its size. Use an LW tractor for shovel clean-up . . . for spotting rail cars . . . for fast push-loading or towing service . . . for heavy construction or dozing to improve haul roads and drainage. You'll also find Tournatractor a "natural" for compacting stockpiles, because when those big tires are hydroflated, Tournatractor provides compaction equivalent to an extra 20-ton roller.

Let us show you how Tournatractor can fit into *your* operations. See how this fast, mobile machine can help you cut costs in a hurry!

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This Tournatractor is one of 3 owned by Bagdad Copper Corp., Bagdad, Arizona. At its open-pit mine the firm works LW tractors 16 hours a day to clean-up around shovels . . . to maintain waste dumps and haul roads . . . to tow stalled trucks and other equipment. Says Mine Superintendent Edward L. Jones, "Our Tournatractors complete a variety of scattered jobs over a wide area fast!" Operator Edgar D. Owings adds, "I sure like the torque converter on this tractor and the big low-pressure tires have more traction, make it smoother riding, too."

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MAY 1960

Transwestern Gas – I

Fulton Crosses Continental Divide

Experienced crews hit 8,000 feet per day pushing 105-mile section through New Mexico mountains.

The big "inch" gas line snakes its way across mesa country of New Mexico headed toward far-off California. Pipe here is being cleaned and wrapped.

PUSHING westward from McCarty, N. M., across rugged mountains and valleys, pipeline crews of R. H. Fulton & Co. have established some of the best progress records on the huge 1,800-mile Transwestern pipeline. Through snow, ice, cold weather, malpais, sandstone and other hard excavation, Fulton's men and equipment have brought average production days well above the mile mark. On good days, 8,000 feet are opened up and finished.

The 105-mile section which the Lubbock (Tex.) pipeline construction firm has under contract will complete the big gas line from its eastern point at McCarty to the Arizona-New Mexico state line near Window Rock. Construction is active on both sides of Fulton's job. Two major spreads of H. C. Price Co. are crossing the state of Arizona. Houston Contracting Co. picks up the line from McCarty, and goes south through Roswell, Carlsbad and eventually to a point near Fort Stockton, Tex., where it originates. Gathering lines are being built by these companies, by Sheehan Construction Co., and by Western Pipeline Co.

Design, engineering and inspection is being handled by Gulf Interstate Co., Houston, Tex. The line will finish in less than a year, and Gulf will relinquish the turnkey system to Transwestern Pipeline Co. for operation.

Texas Gas

Function of the line is to carry natural gas from gathering points in the Monahans-Fort Stockton area of Texas, and blend it with other sources in the Texas panhandle. Pushed by pumping stations along the line, the gas will flow west at about 850-psi pressure toward California, where the market for natural gas is steadily expanding.

Typical of work along the line, Fulton's spread exemplifies the battle in logistics and mechanization which a modern large-scale pipeline job represents. In averaging 3,500 linear feet of ditch excavation a day through rock, somebody has to plan the right leapfrog moves with crawler-mounted hoes. To balance out other unclassified trench excavation to get an 8,000-ft. day, other good decisions must be made to put bucket-type trenching

by Ray Day

machines in the right places . . . and get them out as soon as they hit rock they can't dig.

Somebody must order about 3,500 gallons of fuel each day, and figure a way to get it up to machines at work. It often means sledding it in. Somebody must buy about 500 pounds of welding rod a day and large quantities of other supplies.

Today's pipeline-spread office men write about 350 checks a week. They have payrolls to balance, and equipment records to maintain. Mechanical service work must be fitted into the production line by a master mechanic.

From a weather standpoint, too, it wasn't easy. Most of Fulton's section lies north of U. S. 66, in mountainous country. It crosses the 7,000-ft. high Continental Divide. Working through the winter months was necessary to complete on time. The nights were freezing cold high over this part of the Continental Divide, and the numbing chill of frost penetrated 18 inches into the ground.

Because working through the winter was a calculated gamble, a surefire method of organizing had to be worked out so that equipment would be on the line, warmed up and running, when the crews first hit the job. This was done so nicely, as we shall see, that crews turned in one of their highest production days when it snowed.

On a pipeline spread, assuming equipment to be topnotch, men make the difference between high and low production. Perhaps a large part of the credit for this construction feat belongs to the skill of its men—a crew of operators, welders, oilers, dope men, benders and right-of-way clearing experts who just finished 65 miles of 30-in. line in Minnesota in an amazing six weeks. The same managers—Spread Superintendent F. C. Talley and his assistant, Jack Riffe—pushed the fast-moving Minnesota job with many of these men.

Talley and Riffe are leapfrogging across New Mexico the same as they did in the North. From a headquarters yard in Grants, they kicked off at the east end and pushed rapidly across Highway 66 up grade to the top of the Continental Divide and beyond. When the spread was advanced beyond its economic reach from Grants, the office was moved to Gallup, picking up construction without a hitch and carrying it on to the Arizona line.

If it continues to work as well as early-stage construction, there is every reason to expect the different operations to finish within days of each other. The pipe gang and the cleanup crew have never been over six miles apart. Lowering-in has stayed up daily within 4,000 feet of the dope machine.

Nicely organized and staffed with late-model machinery of the toughest

Closeup of Cat D9 with Kelly ripper shows how powerful equipment probes every foot of the ditch line to find or break up hidden rock. Dirt loosened will dig easier. If solid rock is hit, drill crews will know exactly where to work before hoes go in.

trouble-free type, the daily work of Fulton's spread is represented in a series of operations which shape up like this.

Throughout the 105 miles of 60-ft. right-of-way, there were no large trees. That's ironic. Why? Because preparation of a place to lay the line has turned out to be one of the toughest parts of the job. Terrain is rough. Mountain ridges, steep badland escarpments, flat valleys where intersecting stream beds give up ground water lay in the pipeline's path. One particularly rocky mountain ridge, 3,000 feet long, pinned down the right-of-way clearing crew for an agonizing two weeks before the spot was whipped.

Big Dozers

Fulton staffed this operation with some of the most powerful tractors it could buy. Three Cat D9's were brought in, each machine with a dozer blade and heavy pipelining rippers. Two of the machines were equipped with hydraulic pull-down Kelly single shanks; one D9 was fitted with an Ateco pipeline ripper.

Purpose of these big Cats was twofold. Their large-sized dozer blades cut an enormous amount of material at each pass, so that the three machines in their own right will take care of the major part of an 8,000-ft. daily run. But the large rippers have an important secondary purpose, too. Socked down full depth, they are used to rip both sides of the ditch, and the center. If a ripper is pushed by a second D9, it will cut through hardpan, some of the softer sandstones, shales, and all forms of bedded dirt. It has boosted the output of hoes and trenching machines by an estimated 25% or more.

Helping out with the right-of-way clearing operations are two Cat D8's, both fairly new machines. They have dozer blades to level ground, make cuts and fills, and do the other odd jobs which go with this operation. Right-of-way was started well in advance of joining the pipe together, so that all the problem work could be finished in the clear ahead of the fast-moving pipe crews which followed.

Hard on the heels of the clearing gang come the men and machines which dig the trench to hold the big 30-in. steel pipeline. Two general types of excavation are in use, following very closely.

The first method is excavation of dirt, sand and other loose or unclassified materials by a pair of Cleveland 320 trenching machines. Ripping ahead of these machines by the D9's has increased their production, opened up some formations formerly too hard for them to handle, and reduced maintenance expense generally. Ripping has another advantage here, too. If a ledge of unrippable rock stands in the way, the ripper teeth plot its contour with a high degree of accuracy, so that the trenching machines can then skim off this top portion prior to drilling and shooting.

The second method of ditch excavation is by hoe digging, either with pre-ripping, drilling and shooting, or a combination of both. And in a few formations, the hoes have been able to maintain full production without pre-ripping. The section of ditch is rare which represents a one-material job, however, because the line crosses some of the rockiest, badly folded geological formations on the North American continent.

Rock and dirt spill from dipper of ¾-yd. hoe. This view is typical of pre-ripped ditches. Loosened material digs well; occasional large pieces give no trouble.

Drilling equipment has been standardized around Gardner-Denver compressors and drills. Portable 600-cfm compressors are used for drill power. Gardner-Denver twin drills, cradled by MD-7 Cat pipe-layers, are mobile and fast. At the peak of opera-

Cat operator scoops a blade of material off to the side to level a 60 ft. path for the line. Big D9 tractor illustrates size of the ripper.

tions, Fulton used six complete sets of such equipment. The rigs were used in units, one 600-ft. compressor supplying air for one set of twin drills.

Because the rock is so variable and spotty, a method of drilling and shooting has been worked out which eliminates expensive, unproductive secondary shooting. The twin drills, positioned about 48 inches apart on their mounting, are rotated in such a way that the holes go down along the ditch sides to make a staggered pattern along each side of the trench. Using both Timken tungsten carbide drill bits and Brunner & Lay Rok-Bits, these machines will drill better than a foot a minute, even in the hardest formations. That included 18,000 feet of malpais drilled near Gallup.

If the rock formation is solid and will fracture easily, the holes are carried down only to a point a few inches below grade. In fissured malpais or other seamed formations, where the force of high explosives tends to dissipate through the seams, the holes are sunk about a foot below grade, and then are heavily loaded to ground surface to get the desired breaking effect.

Long runs up to half a mile are shot by the Primacord detonating method, using Primacord risers from each hole, tied to a main trunk line. Primacord MS connectors, arranged to give 10 and 17-millisecond delays, control the blasts, give extra secondary breakage and make for easier digging by hoes. Gelatin duPont powder, 40% strength, is being used to shoot the ditch. What little throw there is, or blown-out piles, are leveled off ahead of the hoes by a Cat D8 dozer.

Special Crawlers

It should be emphasized, however, that the work of this dozer doesn't have to be letter perfect. Several of the new 22-B's are equipped with new "high walker" tracks, which puts the undercarriage of the rigs well above protruding rock, and also furnishes a somewhat longer base than standard. Extra hook rollers underneath have tended to give these machines exceptional stability on grades or slopes. There have been times when the 22-B's, held by winch lines from tractors, have successfully worked 1 on 1 slopes.

Production-wise, the six-hoe fleet has fulfilled every expectation, according to Riffe. Under rough conditions, where terrain was rocky and tricky, the six machines were good for a combined performance of about 3,500 feet of ditch a day. In easier going, they did more than this, often getting as much as 100 feet an hour individually.

Because ditch excavation was so variable, and there were so many rough places to get through, Fulton's field management did everything possible to keep trench excavation as far ahead of the rest of the spread as possible. This objective was balanced, of

Continued on next page

Operation Warmup

IN the numbing near-zero cold of a winter dawn, how do you overcome the natural tendency of men to hang back from work around the nearest warm fire?

Getting the answer to that problem was important to the production on this job, because pushing the line through winter months could have cost an estimated 25% lost time in equipment production hours; that much or more from manpower production. Fulton's approach was simply to do what good management and common sense indicated—get somebody out to the job early to get equipment started up, warmed and running well ahead of the time the crews arrived.

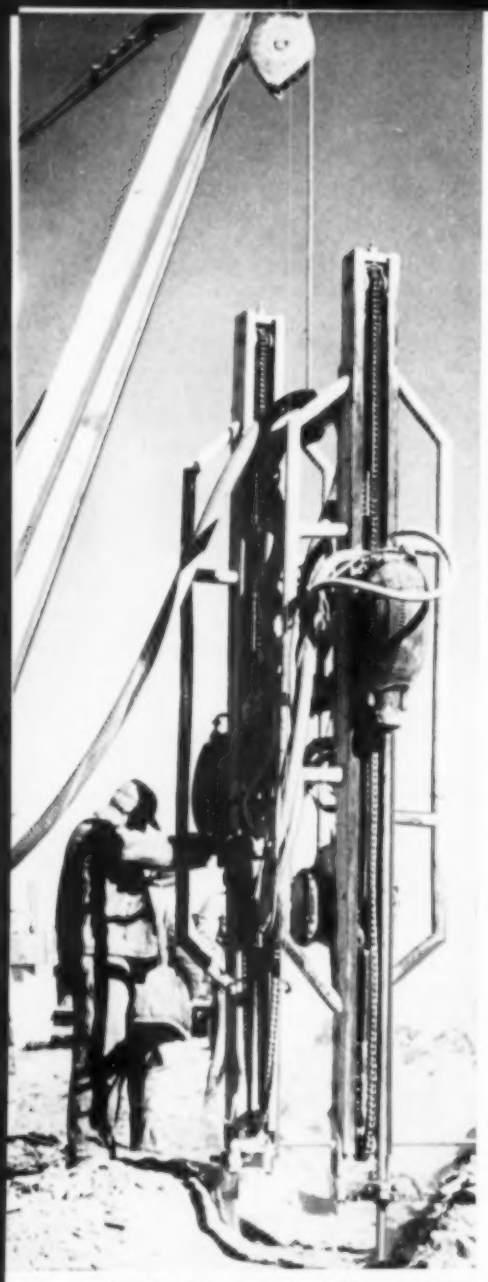
So, about two hours before showup time, mechanics skilled in nursing equipment to life came out to the job, got the buses started and the heaters going. Every piece of mobile equipment moving from the yard to the job was started. If something wouldn't run, there was a tractor handy to pull it until it did. There were starting fluids, extra batteries and special starting rigs with powerful battery equipment.

Out on the pipeline, while it was still dark and so cold it hurt to touch a piece of chilled metal, tractor engines thundered into life, gas flames licked up around the heater elements of dope pots, and the warmup operation started to get cleaning and dope equipment all ready to go. In such cold-weather temperatures, primer and enamel freeze fast, but men skilled with the temperament of machines handling this material had them warmed up and ready to work at top speed when the men first arrived on the job.

Equipment Ready

And fuel tanks were full, the engines were hot, and the man reporting to work was sure that he had a piece of production machinery in his hands instead of something he'd have to nurse for two hours.

Funny thing—this not only justified its cost many times over in daily production, but it did much to overcome the tendency for men to hang back on cold mornings. Working with warmed-up machinery, they jumped in to get the day's work going. And some of the job's best runs were made after some of those bitter-cold morning starts, where only a brave man would report for work in the first place.



Gardner-Denver Twin Drills, suspended from boom of Cat D7 pipelayer, sink powder holes along ditch. Each drill cuts a foot per minute through hard rock.

Fulton . . .

Continued from page 9

course, against getting too big a section opened up ahead, in case of winter snows. The operation was handled well within these limits, so that when hard, tough places had to be crossed, there was plenty of ditch ahead for the pipe gang, and time enough for the hoes to hack their way through the tough stretches.

Unlike some of the other contractors on other spreads, who have subcontracted pipe stringing, Fulton is doing its own. Chief advantage, say project officials, is that it gives better control of this operation, and, if done economically, adds something to the net earnings of the job.

The pipe for this section is being rolled on the West Coast by Kaiser Steel, and shipped by rail to unloading points at Grants, Thoreau and Gallup. All pipe is 30-in. diameter, in 40-ft. joints, with 0.375-in. wall thickness. Some 0.500 and some 0.625-in. thickness line, in 34-in. casing, is being used under highway and railroad track embankments. This is all hydrostatically tested to a pressure of 1,350 psi prior to acceptance of the job.

The 40-ft. steel pipe joints are being handled in each yard by a truck-mounted 15-B crane, whose power is ample to lift such sections with ease, even if yard conditions are muddy. The pipe is unloaded and stacked in the yards well in advance of construction work in the field. Immediately following ditch excavation, it is strung along the ditch. Fulton has a fleet of nine Ford F-800 trucks, which haul 200 feet of pipe at a time.

Pipelayer Unloads

Out at the job, a Cat MD7 pipelayer is used to set the joints off along the ditch. If necessary, the MD7's also string to the spots where the trucks can't quite go.

Installation of the pipeline moves with clocklike precision, in steps as well organized as any assembly line. By the time pipe stringing is done, a Cat D6 front end loader has finished its job of placing four inches of good dirt as cushion material over all rocky sections. Following very shortly behind stringing, sometimes within sight distance of that operation, a Cinch hydraulic bender comes along to do its work.

This machine, tended by a pair of MD7's, bends each joint to the shape it takes to fit ground contours. Some of the terrain is so tough that project officials can admit having made bends as sharp as 15°, although that's about as far as they'll go. There are no reverse bends anywhere in the line.

Special attention is being given to each beveled joint prior to setting each section in the line. All rust first is buffed off each joint by air-powered grinders, which work just ahead of the laying operation. A rather unique method of preheating the beveled joints is being used. It warms up the metal during cold-weather

Good Relations Benefit

GOOD public relations never costs a pipeline contractor. It pays.

Explaining that statement, project officials tell how the simple act of practicing friendliness and consideration has helped the R. H. Fulton Co., as well as the individuals who were concerned on the other side of the fence. For example, it costs very little more when you run a pipeline through a rancher's property—and need good cushion dirt—to call on the man and work out a system for digging your dirt in such a way that it leaves him with a stock-watering pond.

Mutual Benefit

When dozers are handy, it takes only a few minutes to make the pass which will fill a bad gully, repair a hole, or make a few hundred feet of road which that man can use. These investments almost

(Left) At pipe yard, 40-ft. joints of Kaiser Steel pipe are loaded by crane to a waiting Ford truck. (Right) Haul to the ditch begins.

welding, so that cracks, bubbles and any other flaws in welds are eliminated. The secret is a new propane preheating torch developed by M. J. Crose Co. It's so efficient that it will preheat a joint in about 10 seconds. A pair of MD7 pipelayers set the joints into the line. The beveled edges are lined up and held on CRC clamps until the first tack welds are made.

Lincoln Welders

In welding the line, the joints first are tacked with Fleetweld 85 rod. Five Lincoln 300-amp diesel rigs, mounted as a battery of units on an MD7 frame, are used for this work.

Following closely behind come the elite corps of any pipeline spread, the hot-pass welders, using six 300-amp Lincolns on another MD-7. They apply the important inner weld, using Lincoln 3/16 Fleetweld rod.

Filler and cap work is handled by a group of 21 Lincoln 250-amp diesel powered welders, which follow up with the top beads which join the pipeline together. With the welding operation there are three D7 tow Cats, which help out in getting machinery through gullies, up hills, and through other tough spots.

One of the closing construction steps is the protection of the line with cleaning and wrapping. The line is first cleaned of all rust, mill scale and other imperfections by a Crose-Perault machine, cradled by a Cat 583 pipelayer. Another Cat 583, following closely, cradles a Crose dope machine which puts on the protective wrapping. Koppers hot-line primer goes on first, followed by a wrapping of Kerr-Mac felt, followed by Koppers No. 2 enamel, followed by Blue Flag glass wrapping and Kraft paper. There are four Littleford 30-barrel pots for heating this material and supplying it to the Crose dope machine. Also on this spread is a 572 Cat pipelayer, which is used as a relief machine.

Lowering-in is being handled by four Cat 583's, and a 22-B high-walker clam. Assisting too, are a series 14-A D8 with dozer and winch, two Lincoln 250-amp welding machines, and a 20-barrel Littleford patch pot.

Final cleanup is primarily a bulldozer operation, although there is one

Continued on next page

Pipeliners

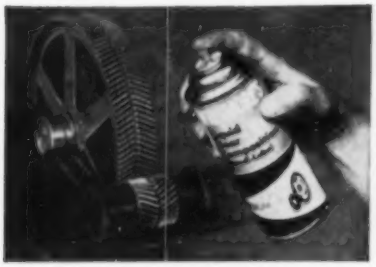
always pay off in much greater tolerance about access matters, less ill feeling if right-of-way limits are inadvertently overstepped, and more cooperation for pipeline rigs which often must get through private property.

Such simple friendliness, applied to a pipeline spread, does just what good fellowship always does —it makes the passage of the line through the country enjoyable for all concerned.

Hydraulic power of a CRC machine puts a bend in the 30-in. pipe in seconds. Pipe now fits terrain without stress. On mountain grades, bends up to 15° are necessary.

TRIAL SAMPLES

Of World-Famous WHITMORE'S Lubricants NOW IN AEROSOL SPRAY-ON CANS!



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For open gears, sliding surfaces—exclusive formulas eliminate metal to metal contact, keep wear on the lubricant not the metal—no breakdown even after prolonged use under water—available for every climatic condition—packaged in handy 16-oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.

WIRE ROPE SPRAY LUBRICANT

Exclusive formulas for lubricating and protecting wire rope, chain, springs. Penetrates to the core of wire rope minimizing internal friction and increasing usable life up to 300%—special protective qualities absolutely eliminate corrosion—non-gumming qualities reduce "carry-back"—packaged in handy 16 oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.

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- Open Gears, Dipper Sticks, Cams
- Enclosed Gear Cases
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- Hydraulic Units, Torque Converters
- Roller, Ball, and Sleeve Bearings
- Speed Reducers

Est. 1893

THE WHITMORE MANUFACTURING CO.

LUBRICATING ENGINEERS

CLEVELAND 4, OHIO, U.S.A. PHONE: VULCAN 3-7272

Fulton . . .

Continued from page 11

Cat No. 12 motor grader on the job. Specifications call for the pipe to be covered at least 4 inches with good dirt, especially through rocky ground where jagged edges could endanger the pipe coating. This material is brought in by a Cat D6, with a Traxcavator front-end loader. Main portion of the backfill is shoved in by a D9 dozer, a D8 and a D7. These machines leave the 60-ft. right-of-way neatly leveled, with extra dirt faired out over the trench area.

Radio Hookup

Strung out over 20 miles at its peak, the project has been well organized and tied together by a Motorola radio communication network, which has increased efficiency and saved thousands of miles of driving. This good communications system, say men who use it, lets them organize and run the job in a way which would have been impossible 20 years ago. The net result is a steady, high-production performance. The Fulton section has been on schedule or ahead always, as it drove westward toward Arizona's setting sun.

After the pipe joints are lined up and first tack welds made, fast-working crews follow with hot-pass welding and grinding.

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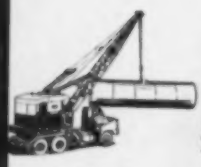

Transit cranes

Crawler cranes

Quarry and mine excavators

Railway cranes

Walking draglines

Stripping shovels

Wheel excavators

BUCYRUS ERIE

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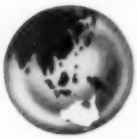
BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin, U.S.A.

RUSTON-BUCYRUS, LIMITED
Lincoln, England



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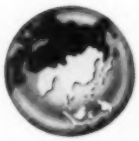

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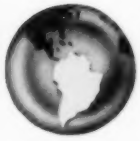

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World's largest manufacturer of power cranes and shovels

Excavators and Cranes — ⅜ to 4 cubic yards (0.28 to 3.1 cubic meters) capacity.

Transit Cranes — 10-ton to 45-ton.

HYDROCRANE® — 5-ton crane (4.5 metric ton); ⅜-cu. yd. excavator (0.28 cubic meters). 12-ton crane (10.9 metric ton); ½-cu. yd. excavator (0.38 cubic meters).

Quarry and Mine Shovels and Draglines — 2½ to 10 cubic yards (2 to 7.6 cubic meters) capacity.

Stripping Shovels — 2½ to 115 cubic yards (1.9 to 88 cubic meters) capacity.

Blast Hole Drills (Cable Tool) — 6, 6⅝, 9, and 12-in. (150, 170, 230, and 305 millimeter) holes.

Blast Hole Drills (Rotary) — 6¾ to 9-in. holes (170 to 230 millimeters); for 9⅞ to 12¼-in. (250 to 310 millimeter) holes.

Walking Draglines — 4 to 36 cubic yards (3.1 to 27.5 cubic meters) capacity.

Railway Cranes — 160 and 250-ton (145 and 227 metric ton) capacity.

Water Well Drills — depths of 500, 1,000, and 1,500 feet (150, 305, and 455 meters).

Oil Well Drills — depths of 1,500, 2,500, 3,500, and 6,000 feet (455, 760, 1,070, and 1,830 meters).

Wheel Excavators (custom designed to owners' requirements). 6Y60

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Curtiss-Wright scrapers not only give you outstanding productive capacity, but also design superiority in every small detail. Ease of control, reduced operator fatigue, improved riding and handling characteristics, and many other less obvious details so important to maximum daily production are given full consideration in every C-W unit . . . insuring superiority in every phase of scraper design, construction and performance.

SOUTH BEND DIVISION
CURTISS-WRIGHT CORPORATION
SOUTH BEND, INDIANA
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TURN PAGE

ESTIMATING EARTHMOVING COSTS

There are several different ways of estimating earthmoving production. There is the wild guess (this has bankrupted many), the educated guess (this depends entirely on the experience of the guesser), and the arithmetical calculation tempered with good judgment.

The latter is the most reliable means of job estimating. It consists of analyzing each segment of the job and arriving at a total required time per unit to move the total yardage.

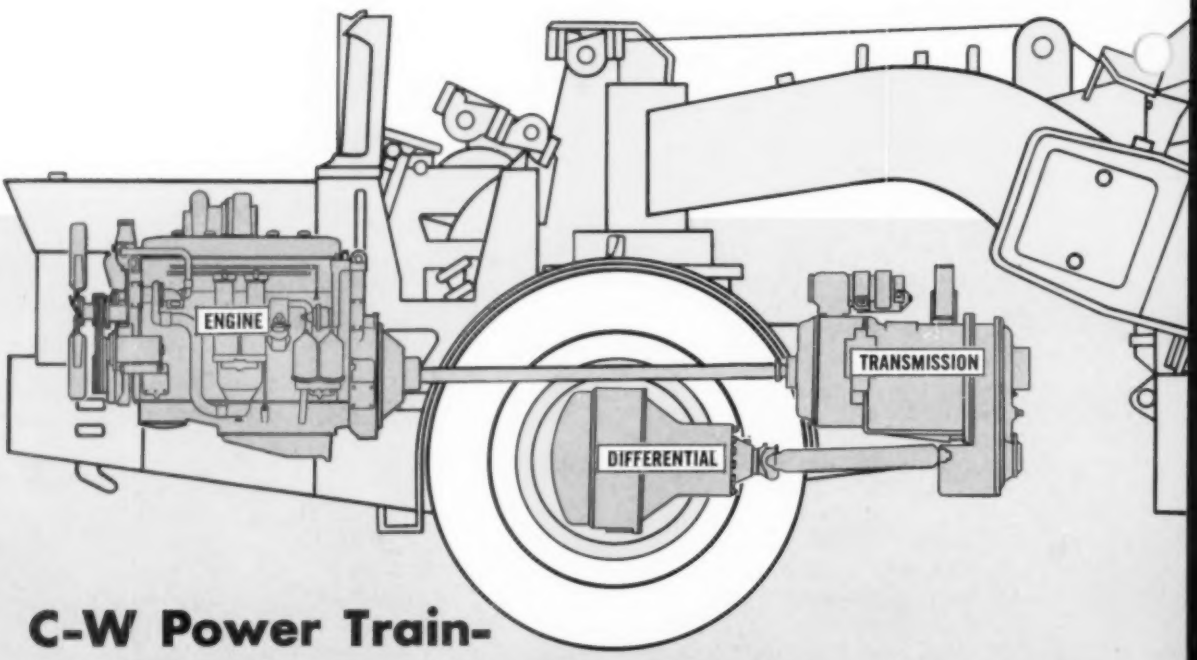
For example: A job has 3,000,000 cu. yds. of excavation. A particular cut contains 236,000 yds. that can go into one fill with an average haul of 3500 ft. The material is sandy clay with good loading characteristics and a bank weight of 2800# per yard. The contractor owns four available CW-226's. The haul will be over the new road bed, compacted, well maintained, with a 3% favorable grade, loaded, and an estimated rolling resistance of 70# per ton. In this type of material, the CW-226 averages a 1.12 bowl factor. Cycle time is figured as follows:

Weight empty	= 85,500#	=	42.75 tons
Load 26 x 1.12 x 2800	= 81,536#	=	40.75 tons
Gross Weight	= 167,036#	=	83.5 tons
Rolling Resistance Empty	= 70#/ton x 42.75 tons	=	2,933#
Grade Resistance Empty	= 20 x 3% x 42.75 tons	=	+2,565#
			5,558#
Rolling Resistance loaded	= 70#/ton x 83.5 tons	=	5,845#
Grade Assistance loaded	= 20 x 3 x 83.5 tons	=	−5,010#
			835#

Spot in cut and wait for pusher	.5 min.
Load	.8 min.
Accelerate	.3 min.
Travel 3500' 4th gear 30 mph $\frac{3500}{30 \times 88}$	1.3 min.
Dump and turn	.5 min.
Accelerate	.3 min.
Return 3500' 3rd gear 16 mph $\frac{3500}{16 \times 88}$	2.5 min.
	6.2 min.

Based on a 50 minute hour (83% efficiency) each unit will make 8 trips per hour $\frac{(50)}{(6.2)}$, hauling 26 x 1.12 or 29.1 pay yards each trip. Hourly production is then 233 pay yards. The CW-226 has an estimated hourly ownership and operating cost of $25.30 per hour. Cost per yard would be $\frac{25.30}{233}$ or 10.8¢ per yard. With four units being used, each should bear ¼ of the cost of the pushers, grader and water truck. Based on a 10 hour shift, the four units would produce 9320 cu. yds. per shift and would work the cut in 25.4 shifts.

Going back to the calculation of cycle time, it should be explained that we are figuring on a tightly-run job with top operators on all units. If such is not the case, the use of two push-tractors should be considered. Loading time is based on the size of the hauling units, size of the push-tractor and loading characteristics of the material. The acceleration figure is a case of mathematics and judgment. Rimpull charts for the CW-226 show 4140# in 3rd gear lockup and 2780# in 4th gear lockup. Previous calculations showed that due to grade assistance only 835# is required to move the load. Therefore, there is excess rimpull equal to 39# per gross ton in 3rd gear lockup and 23# per gross ton in 4th gear lockup. This is a very favorable excess and will result in rapid acceleration. One mph equals 88 ft. per minute, therefore, the travel time formula is $\frac{\text{DISTANCE IN FT.}}{\text{SPEED IN MPH} \times 88}$ with the answer in minutes. Dump and turn time is determined by job conditions. This material will dump quickly and spread evenly for a solid haul road. The acceleration on return is based on the fact that although the unit is empty it has a grade resistance of 2535# in addition to the rolling resistance and therefore will at best be travelling in 3rd gear, convertor stage. Return travel time is figured in the same manner as travel time, loaded. Basing your calculations on the standard 50 minute hour, you should arrive at an accurate estimate of job time and costs.



C-W Power Train-
High Performance with Easy Service

SOUTH BEND DIVISION
CURTISS-WRIGHT
CORPORATION
SOUTH BEND, INDIANA
Distributed in Canada by Canadian Curtiss-Wright Ltd.

From the engine right through the power train, every unit is easily accessible. The engine is easily serviced with the hood raised. With the scraper jack-knifed, the transmission is as easily worked on as if it were on your shop bench. By disconnecting one drive shaft, blocking the tractor and removing the mounting bolts, the entire wheel and axle assembly can be rolled out. This convenience and service accessibility assures C-W owners of minimum downtime for any power train servicing job.

FREE . . . An attractive binder for the complete C-W Job Information series is available from your Curtiss-Wright distributor. Ask for it!

AD NO. 52-74 PRINTED IN U.S.A.

Pilot Glen Arnold gets his aerial taxi ready to go at the small heliport area near field headquarters of H. C. Price Co. at Kingman.

Transwestern Gas – II

Spread Superintendent Heliconnoiters Pipeline

BOB Ezell, spread superintendent for H. C. Price Co., is a man with seven-league boots. He can stay in his office, handling organization and administrative matters until 9 a.m.; then hop all over a 165-mile pipeline job, visiting every gang on the spread. And he can be back at headquarters by 4 p.m., getting a jump on the next day's problems.

Ezell's secret is modern transportation—a small Bell helicopter which Price has rented on a monthly basis from Southwest Helicopters, Inc. of Van Nuys, Calif. Piloted by Glen Arnold, a retired major of the U. S. Army, the chopper has brought dramatic efficiency into the difficult business of running a long pipeline spread. This section of the 1,800-mile Transwestern pipeline, which will carry natural gas from Texas to California, passes through rugged, remote Arizona mountain country where roads are scarce.

It would take Ezell about 4½ hours to visit the right-of-way clearing gang from Kingman headquarters, if he relied on automotive transportation. But he can race 300 yards from his office trailer to the bare spot which serves as a heliport, and fly at 60 to 70 mph to reach the same gang in 30 minutes.

Remote Location

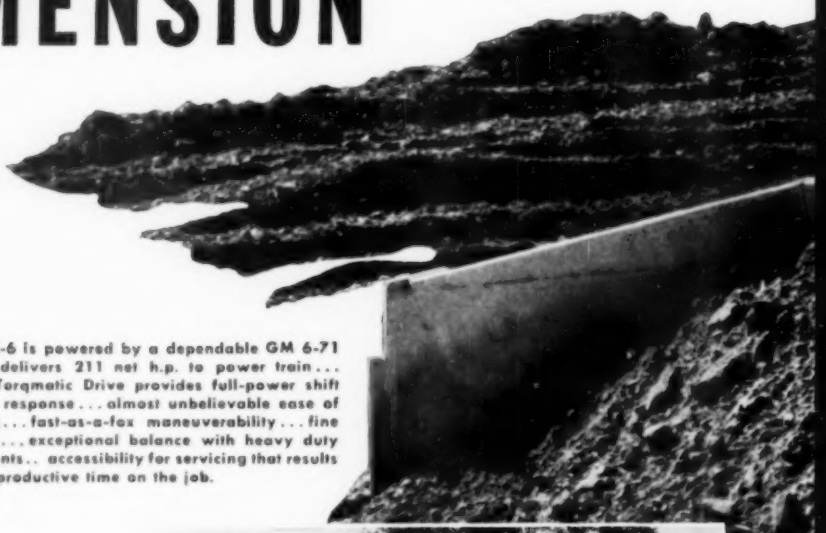
According to Price's officials, the machine will really come into its own when the spread moves to Seligman. Here it will work through mountain country so remote it's 55 miles to the nearest major highway, and nearly 100 miles to the nearest hospital. Anticipating its importance in such an event, the machine has been rigged with a stretcher basket. If anyone is injured seriously, he can be flown to the hospital in minutes.

He pointed out other advantages, too. Flying gives Ezell the advantage of height in looking over each gang, so he can land if something's wrong; go on to the next crew if everything's running smoothly. In emergencies, the flying machine can relay small parts and supplies between Kingman and the machines in the field. In several emergency cases, the helicopter flew to Phoenix, picked up spare parts, and was back on the job fast, saving many production hours. Ezell has a Motorola two-way radio at his side in the chopper, so he can reach his gang foremen instantly. Also, the helicopter's height gives him a monitoring advantage as he listens to the day's business on the air.

The outfit was used for the first time on pipeline work by Price last year in Kentucky. The efficiencies it introduced there were so pronounced that the machine was called in again for the work in Arizona. It's proving beyond doubt the dependability of the helicopter as a supervising and communications instrument for pipeline work. It may be that the machine could save lives, too. And the rental rate amounts to only a minor percentage of the daily labor payroll which a 300-man pipeline job usually represents.

Prior to takeoff, Arnold checks the chopper carefully. Here he tests the Motorola radio which Spread Supt. Bob Ezell uses.

EUCLID'S GREATER DIMENSION



Model C-6 is powered by a dependable GM 6-71 engine; delivers 211 net h.p. to power train... proven Torqmatic Drive provides full-power shift and fast response... almost unbelievable ease of handling... fast-as-a-fox maneuverability... fine visibility... exceptional balance with heavy duty attachments.. accessibility for servicing that results in more productive time on the job.

The C-6 has the speed, power and maneuverability to handle every kind of tractor job... ripping, dozing, push loading, clearing, towing and other heavy work. Many major components including Torqmatic Drive, engine, and planetary drive axle have been job proved in thousands of Euclid earth-movers. Owners say that full-power shift, easy operation and fast response give the C-6 more work-ability than any other crawler in the 200 h.p. class.

Facts and figures on the Model C-6 and Model TC-12 "Eucs" are available from the Euclid dealer in your area . . . get in touch with him soon!

Greater Dimension in power and performance... TC-12 has 2 engines that deliver a total of 425 net h.p.... independent track drive with separate power train and Torqmatic Drive for each track... full-power shift and instantaneous reverse... 8 track rollers... unequalled accessibility for servicing... maneuverability and workability that have set new standards of big tractor performance.

Proven Torqmatic Drives deliver a smooth flow of power to each track... with full-power shift there's no delay for clutching and shifting... change direction with a flick of the wrist... 425 total net h.p. is automatically matched to every job requirement... rigid track alignment maintained by independently suspended track frames and final drives... years-ahead engineering reduces downtime and maintenance costs for a better return on investment.

Crawlers without full-power shift are obsolete . . . and costly!

GM GENERAL MOTORS EUCLID

EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE

IN MODERN CRAWLER DESIGN

With over twenty-five years of experience in building heavy earth-moving equipment exclusively, Euclid offers a greater range of types and capacities, a greater background of field experience, and a greater return on your equipment investment.

One example of this greater dimension was the introduction of the Model TC-12 Crawler over 5 years ago. Here was an entirely new concept of tractor design . . . two engines, each driving a separate track through its own Torqmatic Drive . . . unequalled power and work-ability . . . performance that set a new standard of crawler productivity . . . ease of operation and servicing that is still unsurpassed in the industry.

Recently the Model C-6 Euclid tractor went into production after the most comprehensive field trials and proving ground testing ever given any new Euclid model. It, too, has Torqmatic Drive and full-power shift as well as many of the advanced design features of the bigger TC-12. And like the "Twin", the new C-6 utilizes major components that have been job proved in thousands of "Eucs" in construction, mine and quarry service. For instance, the Allison converter and semi-automatic transmission "package" has long since passed the pioneering and development stage . . . it's been used in "Euc" scrapers, rear-dump haulers and other models for years. These two Euclid crawlers provide so much more work-ability that they obsolete tractors without the operating advantages of full-power shift.

EUCLID Division of General Motors • Cleveland 17, Ohio

Transwestern Gas – III

They Strung a Snowbound Pipeline

Crews battle mountain grades in midwinter; steady progress made on Houston Contracting's 149-mile section at Corona, N. M., where 20% of the ditch must be drilled and shot.

MEN have pushed big-diameter steel pipelines across the mountains of New Mexico before, but seldom under such trying conditions as Houston Contracting Co. crews faced last winter. Local residents agree the cold weather was the state's worst since 1919.

High, mountainous terrain and rocky excavation in sandstone, granite, limestone and malpais were compounded by raging blizzards, zero weather and lack of access.

Near Mountainair, Houston's men and equipment pitched in with another contractor to rebuild approximately 10 miles of county road from scratch, to get into one tough stretch. Hoes were operated on slopes so steep that lubricating oil blew out of the breather caps on engines.

They say that pipelining is never easy. It's true. And while there are many examples of tough pipelining on the 1,800-mile Transwestern route, nobody fought a tougher battle than Houston's men, under Spread Superintendent L. A. Young.

Varied Topography

Young's spread calls for a 149-mile section of the big 30-in. gas-transmission line, which ultimately will gather natural gas from western and northern Texas, and deliver it through New Mexico and Arizona to the California state line at Topock, Ariz. The spread begins in mountainous country near Corona, N. M.; crosses other high mountains between Mountainair and Belen; drops down into the Rio Grande valley to cross the river; and then heads for high-mesa country again. It finally terminates near the old Indian town of Laguna.

Here, R. H. Fulton & Co. picks up another contract section to take the line on to Window Rock, Ariz. Houston Contracting Co. also has two other spreads which will complete approximately 54 miles of 30-in. line from Corona into Roswell, N. M.; approximately 61 miles of 20-in. and 165 miles of 24-in. pipe from Fort Stockton, Tex., to Roswell; and about 165 miles of 24-in. pipe from Dawn, Tex., to Roswell.

Chicago Pneumatic drilling equipment works a rocky ridge to get powder holes down for the pipeline trench. The driller on this rig rotates the hanging carriage to position his tungsten carbide bits on each side of trench . . . then crowds on the air.

This section looked easy until hoes scooped down; then solid rock showed up. Powdermen load to blow the trench line wide open.

H. L. Price Co., of Bartlesville, Okla., has all the mileage of the Transwestern pipeline route in Arizona.

Behind the organization of Superintendent Young's spread lies a wealth of pipelining experience, combined with the wisdom of years which Young has gained on many phases of pipelining. At one time he was a welder. Then he became a welder foreman, and he's also done many of the managerial things which finally make a spread boss.

A visit to this spread leaves little doubt that the job is organized beautifully from right-of-way clearing to final backfill and cleanup. The fact that the entire 1,800 mile Transwestern pipeline will be finished in a year or less from its kickoff date is a tribute to organization, equipment, and all the contractors concerned.

Starting from an initial kickoff date of Nov. 5, 1959, Young was ready to begin pipe laying 15 days later, so rapidly had right-of-way clearing been pushed. This is primarily a dozer and ripper operation. Trees are scrub cedars and pinion pines, so the dozers can handle the job of clearing such trees. Big machines were picked—two Cat D9's and three D8's. Two D7's also were brought in for some of the smaller work. A heavy-duty single shank Kelly ripper tipped with H&L boot and tooth was mounted on one of the D9's, as well as on one of the newer D8's.

Preparing the 66-ft. right-of-way consisted of felling and burning all the brush and trees; making shallow fills; and cutting through rocky terrain where steepness would be a deciding factor in getting machines in and out—and also to remain within pipe bending tolerances. In some places, 12-ft. deep rock cuts had to be made. There were many times when the right-of-way crew had to borrow compressors and drills from the crews farther back along the ditch.

Once the right-of-way was cleared and the ditch route established, every foot of the trench was ripped, either by the D9 or the D8. By ripping the trench 5½ feet deep, several production advantages were realized. First, the passage of the ripper showed what kind of formations were to be dug. If the ripper passed through easily, it meant that the Buckeye 48 and 51 wheel-type ditching machines could handle this ground at high speed, and that their performance would be enhanced from 20 to 30% by the preripping.

If the rippers got into rock so tough that it was necessary to cable-hook a D8 ahead of the D9, it meant that this ditch portion—no matter how tough

Two hoes tackle heavy rock—a Northwest 41 in front and a 22-B in the distance.

—could be excavated by the fleet of hoes on the project. If the D9 and its ripper were unable to get down, it meant a job of drilling and shooting, for certain, in solid rock. These rules of thumb held true from one end of the job to the other.

But it was brutal business. To get down through some of the hard rock with rippers, it was often necessary to replace tooth points once an hour.

Rippers Smoke

They socked in, became hot with abrasion against the hard rock, and burned up. But in that hour's time they saved so much drilling and shooting, and opened up so much area for hoe equipment, that the replacement cost was fully justified even on that frequent a replacement factor. Men soon found that when the rippers rolled out huge chunks of rock in getting down to grade, that the hoes later on would be able to pick up the loose material and make a ditch. This operation was carried along very close to right of way clearing.

Young estimates that about 20% of the job required drilling and shooting in some degree, much of it full depth. Rock formations included granite, lava flow, sandstone, and some limestone rock, all of which was tough to get through.

Staffing up for the job the company brought in two Gardner-Denver 600-cfm portable compressors, each machine powering a set of Gardner-Denver twin drills. Six Chicago Pneumatic 600-cfm portables with CP twin drills also were on the job, cradled on MD7 pipelayers. By rotating the twin drills until they reached the trench sides, drillers were able to sink Timken and Brunner & Lay tungsten-carbide bits through the toughest formations at the rate of about 700 feet per bit per sharpening. Imaginative use of ripping equipment cut out much drilling and shooting in softer, more marginal formations.

On the theory that it's seldom wise to undershoot a pipeline ditch in rock, and have to go back with expensive secondary drilling and shooting, Young's powdermen loaded the holes from top to bottom in a tight, tamped column. As many as 17 sticks of 1⅛ x 8-in. 40% Ammodyne was used to tamp a 5½-ft. deep hole full of high explosive. These columns of powder

(Left) Cat MD-7 pipelayer stabs a joint into position. Handle protrudes from make-up clamps which hold jointed locations tight. (Right) Just before sections are connected, a workman preheats each joint with butane torch to minimize weld stresses and cracking.

Pipelines don't come easy. Typical rocky characteristics of the whole job show here. In some places, rock cuts were 12 feet deep.

were tied to Primacord risers, and MS connectors delayed the shots from 10 to 17-milliseconds. Lengths of ditch up to 1,000 feet were shot at one time, setting off the Primacord with a stick of dynamite, an electric cap and a hand blasting machine.

All ditch broken this way was then excavated by a fleet of modern hoes, including six Bucyrus-Erie 22-B's and two Northwest 41's. There were also a pair of 22-B clamshells on the job for structure excavation and other work.

According to Ditch Foreman Nolan Ary, the hoes gave a good account of themselves in very rocky digging. Most of the 22-B's are new, incorporating the "high walker" tracks for rock or muddy ground. These machines are powered by Caterpillar D318 diesels, and have ¾-yd. dippers, either Bucyrus-Erie or Esco. Working over blasted portions of the trench is easier on the machines than in some areas where ripping was done. It's a very difficult, bruising type of digging, but even so, the hoes have often turned in footages as high as 700 feet per day per machine. It should be emphasized that these are peak days. Production naturally drops off in the tougher digging, where a considerable amount of chopping or other such hoe action is necessary.

Stringing the Republic-made steel line has been subbed to Parkhill Co., of Tulsa, Okla. From base yards at Tecolote, Mountainair, Belen and Laguna, Parkhill has kept its fleet of Ford F-800's and GMC's busy, stringing the steel joints through the mountains. Parkhill's job was especially difficult between Highways 54 and 60, because this was high mountainous country, and heavy winter snow covered most of that area. It was through this section that Young's men and equipment worked so hard to rebuild 10 miles of county road.

Mechanized Forces

Assembling the pipeline is a fully mechanized operation, starting with a Cat MD7 pipelayer. It picks up the doubled 30-ft. joints, and moves the 60-ft. piece back into position on CRC inside line-up clamps. Previously, of course, a Crose bending machine has finished its work on joints where bending is indicated. The beveled edges have also been ground free of rust, and in cold weather a propane-fired heating torch has preheated the joint ends.

Stringer-bead welding is being handled by four Lincoln electric 300-amp, 40-volt welding machines, mounted on a TD-18 International tractor, and driven by the power system from its engine. Immediately behind this rig comes a TD-20, also mounting four Lincoln welders. These make the hot-pass welds, using $\frac{5}{32}$ Fleetweld 85 rod. Strung out behind are 18 Lincoln 250-amp diesel-driven machines, on wagon mountings, which apply the filler and finish beads.

When the pipe joints are all made, a CRC cleaning and priming machine, cradled on an Allis-Chalmers HD-20 tractor and Tractomotive sideboom, moves in. It removes all rust and foreign matter from the pipe exterior. A wide-gauge Cat D8 sideboom also is used in connection with this operation, picking up the pipe powerfully but gently as the machines do their work. Following close behind is a Crose dope machine. It's cradled by a Cat 583 pipelayer. Another Cat wide-gauge sideboom is used as a catch-off tractor.

CRC pots supply the dope machine with hot material, so that it can apply, in order, bitumastic enamel; Kerr-

Ditch Foreman Nolan Ary points out special triple tow plates on crawler base for holding hoe on steep slopes. Photo shows extra clearance of high-walker tracks for big rocks.

Proper support of a big pipeline under construction is one thing which contributes to speed. Cribbing is in good condition, and is kept up tight with joint placement.

Stang wellpoints and vacuum pumps work to unwater the pipeline ditch in the Rio Grande River bottom near Belen, N. M.

Lincoln welding machines mounted on TD-18 tractors bring mobility to the hot-pass crews. Men make a busy scene here as they swarm over the freshly jointed pipeline.

Mac glass paper or felt; and Kraft. The finished coating is spark tested to detect any holidays, and a near 100% x-ray inspection guarantees the perfection of welded joints.

Before the pipe was strung, a Euclid TS-18 scraper had hauled in selected dirt for all areas where the pipe passes through rocky country. Augered into the ditch, the material was placed 4 inches thick below the pipe. Lowering in is handled by two Cat 583 pipelayers, two Allis-Chalmers HD-20's and an A-C HD-16. These machines have either Tractomotive or Trackson pipelayer booms.

Cushion Pipe

In rock excavation, cushion material is placed, after lowering in, to a point 4 inches above the line. Select material is hauled in by a special Euclid TS-18 and a Cat DW21 and dumped on the working side of the right-of-way. A Michigan 275-A tractor-shovel, whose reach gives good positioning of the material, then places the cushion in the ditch on top of the pipe. Following this, the final

backfill is placed by a pair of D7 backfillers and the right-of-way is smoothed off.

All in all, this has been one of the top producing spreads of the system. In good terrain and reasonably good weather, production as high as 12,000 completed feet per day has been recorded, dropping down to about a mile per day in rough terrain, rocky ground, or bad weather. Between the kickoff date and March 15, the whole 149 miles of Young's section were laid and completed—with the exception of some valve and testing work.

And the interim dates include some time which was so snowy and icy that no one could work. It represents one of the most amazing pipeline feats, under rough conditions, as might be expected anywhere.

Snow: Pipeliners' Enemy No. 1

OF all the problems in building this section of the Transwestern, Supt. Young unhesitatingly put snow at the top of his problem list. It filled 32 miles of ditch at one time; clogged highways and right-of-way; made mudholes when it melted. It gummed up the works all the time it was there.

The problem of snow in the pipeline ditch was particularly bad, but Young's crews attacked it with real ingenuity. From Denver, they brought in a small model of the Sno-Blast, a rotary snow removal device which is patterned after the Rolba system originated in Switzerland. The trick to this machine consists of a series of auger knives, which cut the snow loose from the bank, and move it to a vortex point where it can be picked up while it's in motion. In other words, when the snow reaches the point where a blast of fan air will move it, it's already in motion, falling from the knives.

The machine worked fine, with the exception that it was crowded in the pipeline ditch. It was impossible to adapt the machine in short order to work in this restricted location. It could have been done, though, and had there been enough time, Young still wishes he'd have built the adaption. But time was pressing, so he resorted to another old method which did the trick.

Clam Out Ditch

Two 22-B clamshells were brought in, and they were able to clean out 2,500 to 4,000 feet of ditch per shift. The clams stayed ahead of the pipeline crews until the snow eventually melted in the ditch. But even so, it was an added expense every time the gray skies began to loose their white deluge.

Crose squirrel-cage type padder supported by a Cat 583 pipelayer collects, sifts and spreads a protective layer of fines over pipe.

Road sign gives drivers friendly warning of work ahead. It also does a good public relations job. Motorists can see where their gas tax pennies are being spent.

Ingenuity Speeds Florida's Interstate Highways

Discarding the rule books, contractors pit know-how against troublesome terrain.

UNDER the twin pressures of tight schedules and even tighter cost margins, contractors on Florida's budding interstate system have worked out bold new techniques to lick some old road-building problems. In many cases, simple ideas—push-unloading of scrapers, for instance—proved to be big time savers. Other sections produced fresh thinking on such standard jobs as muck removal. Job-built machines, like a unique root-chopper for land clearing, got dirtmoving off to a fast start.

As is often the case when a job set-up breeds bright solutions, ingenuity paid off twice for the contractors involved. With rare exceptions, their crews paced the rigid timetable. On top of that, most of them figure to clear a fair profit on sections that drew some of the keenest sharp-pencil bidding ever seen in the Southeast.

60-Mile Stretch

Perhaps the greatest variety of methods and machines assembled in one place since the 1957 Road Show in Chicago works a 60-mile stretch of Interstate 4 between Lakeland and Orlando. Nature never put together a better proving ground. The terrain varies from flat sawgrass prairies to rolling sandy hills. Soil runs anywhere from watery silt to rubbery clay—and often within the span of a few chain lengths.

"This is the only place I've ever worked where you can stand up to your hips in mud and have sand blowing in your face," one job super says of his section.

The foreman of a pile-driving gang watches a long stick sink into a quicksand pool and laments, "Just the other side of this bent, we couldn't drive a 20-footer into the clay."

This humorous griping serves as a safety valve for men on the spot facing new problems every working day. But they are also quick to point out the bright ideas that solve the problems. This puts the griping in proper perspective.

One short section of the job—a 5.44-mile stretch near Orlando—offers a capsule view of the troubles and triumphs of the contractors on Interstate 4. Here, Wiley N. Jackson Co., Roanoke, Va., is pushing the double-barrel route across swampy flatlands. It's a borrow and fill job—strip dirt from pine hummocks to build a broad embankment.

A task force assembled by L. A. Reynolds Co., Winston-Salem, N. C., took charge of grading for an interchange with state route 435—main feeder road serving the area south of Orlando. Close to 900,000 cubic yards of fill had to be borrowed for the ramps and loops of the pretzel.

Ernest Wilcox, Reynold's super, first of all scouted the job to plan his attack. He walked the route, but gently. With every step the ground gave under his weight. A thin veneer of peat covered the quaking gumbo beneath.

First problem: remove the muck. Draglines turned the trick. They scooped out nearly 55,000 cubic yards, which were spoil-piled nearby. (*Excavating Engineer* details a high-speed mucking job later in this article.) Then trucks filled the holes with clean sand and built a broad haul road to the borrow pit site.

Finding nearly a million yards of borrow stacks up as a tough task anywhere. In central Florida it is al-

Sharp knives on rotating drum of this root cutter chop through matted growth that chokes scraper productivity in the borrow pit. Cat D7 pulls the novel shop-built rig.

Push-unloading of the heaped scrapers cuts seconds off cycle time and gives a more uniform spread of dirt. The push-dozer picks up incoming pans a good distance down the haul road to help boost their travel speed as they approach the fill.

most impossible. Wilcox had to make do with what he could get—a broad pine hummock about a ¾-mile distance from the interchange. Here the ground rose a couple of feet above the marshland; water still lurked just beneath the surface.

Drainage was the obvious way to get the soil in shape for loading. Again the draglines moved in. They cut deep ditches that sliced the 28-acre pit into parallel strips wide enough for easy scraper turn-around. Water channeled into a main drain that diverted flow from the pit. The haul road crossed from strip to strip on fills put in over sheet-metal culverts.

Remove Undergrowth

Every inch of Florida that sticks above water soon sprouts some growth—motels, orange groves or dense tropical underbrush. The pit on L. A. Reynold's job fits in the latter class. Clearing the pine trees posed no problem. A couple of Cat dozers toppled them for easy salvage by timber outfits.

The spiny palmetto died harder. Like an iceberg, it lies two-thirds beneath the surface. Its stringy roots twined into an impenetrable armor that defied dozer blades. Ripping would be a tedious and costly process; Wilcox had to expose the borrow lode fast.

The problem was solved by a Rube Goldberg device—one that worked

(Left) Tail-mounted Waukesha engine spins the cutter drum at 30 rpm. Operator stands ready to disengage the clutch if the drum snags on hidden logs. (Right) Lorain dragline with 1-yd. bucket opens a 10-ft. deep drainage ditch alongside interchange ramp.

Dragline (left) and pump (right) team up to lick a king-size muck-removal job. Turbine pump, powered by an engine from a scrapped auto, removes 2,800 gallons of water a minute from muck pocket.

better than anyone dared hope. Like a hundred laborers with sharp hoes, the root cutter rolls down the strip shredding the tightly knit subsurface network. In one pass it opens up the soil for easy scraper loading.

The root cutter's business end is a rotating drum about 12 feet long, fitted with three rows of sharp knives. A 150-hp Waukesha gasoline engine spins the drum at about 30 rpm through a torque-converter-cushioned power train.

A Cat D7 crawler tractor pulls the cutter at a steady pace. The catskinner keeps an eye out front and back. He guides the rig along the strip, all the while checking the knives to be sure they're at proper cutting depth. As the tractor wobbles over a rough spot he "plays" the controls, lowering the drum till it rides just inches above ground surface.

On the observation platform behind the drum, a worker sets the speed for good chopping action. He also kicks out the clutch when hidden logs snag the drum. He doesn't have to worry about debris piling up in front. Because the drum faces 45° away from the forward direction, debris is cast well aside.

The sandy loam in the borrow pit and the long haul set the stage for scraper handling. Wilcox brought in a fleet of rubber-tired pans—three Caterpillar DW21's with No. 470 scrapers, and a Michigan 210 scraper. Here was a spread that assured him top speed on the haulways. Now he worked to cut down delays at both ends of the run.

Unloads Faster

Push-loading solved the problem in the borrow pit. As a pan squares away for the loading run, a Michigan 380 rubber-tired dozer nuzzles up to the push block. With almost 600 horsepower behind the blade (300 in the scraper; 300 in the pusher), dirt boils up fast in the pan. In 45 seconds the hauler roars off down the road with a heaping 20-yd. payload aboard.

The push-dozer wastes little time scooting back to pick up the next pan on the run. In fast reverse, it hits nearly 30 mph. The tractor literally floats over the soft soil on 33.5 x 33 Goodyear tires. The oversize shoes give sure-footed traction on the push run, too.

Results of a push-unloading test proved extremely rewarding. Wilcox needed a dozer to spread fill. When a Michigan 280 rubber-tired tractor took over the job, dirt really flew. The rig had plenty of time (and plenty of get-up-and-go) to speed unloading of the scrapers, to police the haul road, to help on shoulder trimming—all the while keeping up with its spreading chore.

Push-unloading, as practiced on the Reynold's job, cuts valuable seconds off cycle time. The dozer meets pans a hundred yards up the haul road, using its 260 horses to boost speed almost to 40 mph. The added speed helps the pans put down a more uni-

Cat D7 dozer piles up for future disposal the muck pulled from pocket by dragline.

form lift of fill, and they get a faster start on the return leg of the cycle.

Adding to its value on the fill, the dozer compacts as it spreads. In fact, just the rolling action of the dozer and scrapers brings the soft loam to specified compaction. This means more to the contractor than getting by with one or two units less in the spread. It reduces tie-ups by opening the entire width of the fill for double-header unloading of pans.

Payoff for the time-saving innovations on this job can be ticked off on a stopwatch—or read in Wilcox's log book. Cycle time on a typical haul (3,000 feet one way) comes to less than six minutes. The scrapers move up to 6,000 pay yards every 9-hour working day.

In the contract section just a mile or so to the west, a local specialist is showing out-of-state roadbuilders how to streamline muck removal. He has almost an ideal set-up for his demonstration. In the 7.2-mile long stretch (under contract to R. B. Tyler Co., Louisville, Ky.) five muck pockets straddle the right of way. In the specs, the sub-soil excavation item calls for 59,000 cubic yards. Present guesses place the actual figure at perhaps half again as much.

The added yardage to be removed puts a squeeze on Lefils & Daugherty, subcontractor on muck removal. The firm, however, is not running scared. They have two aces in the hole—years of know-how in the game, and machines to back their smart methods.

G. J. Lefils (he doubles in brass as partner in the firm and dragline-runner on the job) explains that muck removal can be simple. Water control holds the key. Output of the excavator goes up as the water level goes down—and almost in direct ratio.

"All that keeps this area from becoming a lake is the pump over

Continued on next page

Florida's Interstate Show

SOMEDAY soon as America's first Astronaut banks toward the landing pad at Cape Canaveral, he may be surprised by the changes that took place in the landscape during his short visit to outer space. For Florida, already known as a way-station for interplanetary travel, has wasted no time getting its earth-bound road system in top-notch shape, too.

Progress Made

The Sunshine State ranks among the nation's top ten (and leads the Southeast) in mileage of interstate highways completed or under construction. This progress takes money—some $119,187,000 up to the end of last year. Before the state's share of the nationwide network is finished, about 1,100 miles of superhighway will be built at a cost of $930 million. That is almost as much money as Florida spent on ALL its roads in the 45 years prior to 1960.

What shows for the $119 million already spent? Well, from the air the skeleton of the system takes form. Short lengths are opened to traffic. Broad causeways speed cars across Biscayne Bay between Miami and its glamorous sister city Miami Beach, and across Tampa Bay on the Florida west coast. Expressways slice through Jacksonville, cutting from hours to minutes the time it takes tourists to travel across the city.

Interstate 4—only part of the net entirely within Florida—is the best showcase of the state's progress. Now over half finished or under contract, the highway fits like a belt across the mid-section of the peninsula from the Gulf to the Atlantic. By the end of 1961, the entire 175 miles of route 4 will be under traffic.

The rest of Florida's interstate work sails full steam ahead despite storms brewing on the political sea, and high costs that threaten to shrink mileages. (In some sections of Miami, right-of-way costs as much as construction.) Despite these minor hurdles, planners have no doubt the state will meet time schedules on its end of the now-familiar boast of federal road authorities: "From Maine to Miami without a stoplight."

Interstate highways will tap all of Florida's major population centers. Over 50% of 1-4 (solid line) is completed or under contract; rest will be done in 1961.

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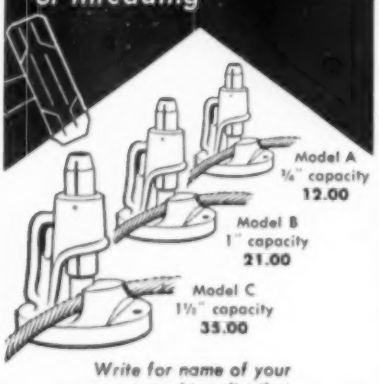

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Sunshine Route . . .

Continued from page 31

there," Lefils points out, as he takes a break from his station at the dragline controls. His Bucyrus-Erie 30-B stands at the end of a long ditch it has dug around the edge of the bowl-shaped muck pocket.

"We couldn't take this one out in a single lift," he explained. "Figure it runs about 26 feet deep in the center. So we're draining the top 15 feet—a good digging depth for this machine. That's a mistake many contractors make. They slow themselves down by trying to take out too deep a cut at one pass."

The dragline stands on sturdy timber mats that give good flotation on the semi-solid ground. Working his controls smoothly to get peak output, Lefils scoops out two yards of musty-smelling black peat with every swing of the dragline. The B-E bucket is rated at 1½ yards; 6-in. sideboards boosted its capacity by one-third. There is no strain on the machine, though. Density of the peat (which is really matted, decaying vegetation) rates somewhere between corn flakes and loose snow.

Lefils works like this. Starting from the pump sump, he digs the drainage ditch in a sweeping arc around the perimeter of the pool. When the water level drops, he begins the excavation job. Working a back-and-forth pattern across the pool, the dragline loads muck into haul trucks. The peat makes good dressing for grass on the backslopes of ramps and embankments.

In the first stage of the job, spoil is simply cast up on solid ground and dozed into stockpiles. Toward the center of the pool, however, material has to be handled as many as four times. The dragline re-casts the muck till it is out where trucks can load up without bogging down. Output of the 30-B is a steady 200 cubic yards per hour.

The pump station at one end of the muck pocket looks "Jerry-built," but swallows anything that collects in the sump—from silty water to off-course rodents. A turbine pump (familiar sight in irrigation districts) moves 2,800 gallons per minute through corrugated metal culvert pipe to a drainage channel off the right-of-way. The pump is powered by a gasoline engine salvaged from a scrapped Plymouth auto.

"Definitely management material—
I like the way he butters me up!"

Lefils looks on the interstate program as a great opportunity for small contractors like himself. He knows he can't pull down one of the million-dollar-plus prime contracts—not yet, anyway. But he is set to grab off a lion's share of the subsoil work because he can do it better and cheaper than the prime. That is the pattern that emerges as the road program rolls into high gear. It's a big program—but not too big for the alert small contractor to get in on if he has the know-how, owns the right equipment and uses a good preventive maintenance program.

Scraper heap-loads in 45 seconds with hefty assist from a Michigan 380 rubber-tired dozer. Track patterns in the sticky loam dramatize the iron grip of the 33.5 x 33 tires.

Deep-Well Pumps Dewater Lock Excavation

An overhead view of one end of the project shows the lock gate wall in the foreground, the bascule bridge for highway and rail use, and sheet-pile walls of the approach.

by Bennett L. Raffin*

BARGE canal locks under construction at West Sacramento, directly west of the Sacramento River, are an important link in a major project to push through a deep-water channel from the Pacific Ocean to California's inland state capital.

The $41 million Sacramento-Yolo deep-water channel and port project will fulfill 25 years of planning to return ocean-going vessels to the city of Sacramento, famous in the gold-mining days as a port for sailing vessels.

The project extends from Suisun Bay to Sacramento, a distance of 43 miles. It includes in addition to the ship channel:

1) A triangular harbor and turning basin at Washington Lake.
2) A connecting barge canal with navigation lock from the harbor to the Sacramento River for transfer of barges between the two waterways;
3) A single-leaf combination highway and railroad bascule bridge across the canal.

The ship channel will be formed by widening and deepening existing channels from Suisun Bay to a point about 6 miles upstream from Rio Vista, a distance of 18 miles. The remaining 25 miles to Washington Lake will be a new channel excavated to 30 feet below mean lower low water. Bottom width will be a minimum 200 to 300 feet.

Shorter Route

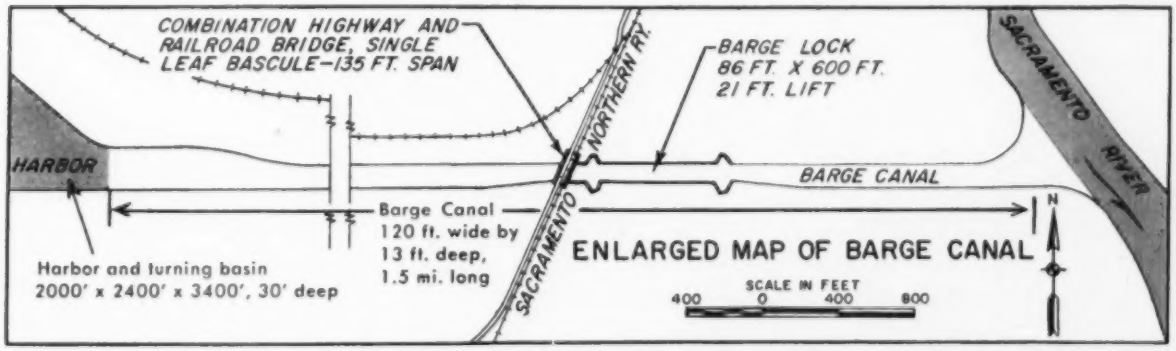
The new ship channel, 20 miles shorter than the existing river route, will permit ocean-going vessels to proceed directly to Sacramento.

These deep-sea ships will provide low-cost water transportation for 24 northern California counties, permitting shippers and receivers of freight in that area to reach worldwide markets on a competitive basis. Designed by the Corps of Engineers, the overall project should be completed in mid-1962, depending on Congressional appropriations.

This 50-hp electric deep-well turbine pump reaches 70 feet into the ground.

The barge canal lock is situated where the channel rejoins the river,

*Rothschild, Raffin & Weirick, Inc., San Francisco, Calif.


COMBINATION HIGHWAY AND RAILROAD BRIDGE, SINGLE LEAF BASCULE—135 FT. SPAN
NORTHERN PT.
BARGE LOCK 86 FT. X 600 FT. 21 FT. LIFT
SACRAMENTO RIVER
HARBOR
BARGE CANAL
Barge Canal 120 ft. wide by 13 ft. deep, 1.5 mi. long
Harbor and turning basin 2000' x 2400' x 3400', 30' deep
SACRAMENTO
ENLARGED MAP OF BARGE CANAL
N
SCALE IN FEET
400 0 400 800

The 1½-mile long Sacramento barge canal and lock will connect the Sacramento River with the harbor area in Lake Washington.

near West Sacramento. Consequently, the water table at this juncture is nearly at ground level. Among construction "firsts," the barge lock will have the highest lift sector-gates ever built.

The job of excavating and constructing the lock, including the bascule bridge, was let as a $6½ million contract to a joint-venture firm, Lock-Bridge Constructors. The joint-venture firm is composed of Rothschild, Raffin & Weirick, Inc., the sponsors; Yuba Consolidated Industries, Inc.; and George Pollock Co.

Deep Hole

A huge excavation was required, 250 feet wide, 2,000 feet long and 47 feet deep. The specifications developed under the supervision of the Army Engineers clearly stated that:

"Unless otherwise specified, all operations in connection with construction of permanent parts of the work shall be carried on in the dry."

Preliminary soundings indicated that the water table during early stages of the job would vary from five to ten feet below ground surface. Furthermore, during anticipated high river flows, the ground table would sometimes rise all the way to the surface. The material to be excavated was composed of layers of silty sand, dense fatty clays, sandy clay and coarse river gravels.

After a 70-ft. deep test-hole well was sunk on the edge of the area to be excavated, pumping showed that the water table dropped quickly for a considerable distance away. As an example, after 24 hours of test pumping, the water table at a distance of 150 feet had dropped five feet as shown by a second test-hole. Consequently, after consultation with the Corps of Engineers, Lock-Bridge Constructors decided to keep the job dry for an estimated three years by sinking deep-well turbine pumps.

Each pump was 70 feet long, driven by a General Electric 50-hp electric motor. The pumps were a product of Pacific Pumping Co. They have nearly two years of service behind them, running continuously and operating automatically. At the start, their pumping reached the rate of 16,000 gallons per minute of water removed. This rate, as excavation deepened, fell back to an average of about 7,000 gpm.

Earthmoving at present is practically complete, except for a section used as a temporary by-pass for the railroad over the canal.

The earthmoving fleet consisted of three Caterpillar DW21's; four D8 dozers; three Euclid S-12 scrapers; two Caterpillar No. 12 graders; two LeTourneau-Westinghouse model C Tournapulls; and a Euclid water truck for dust control. These units developed a maximum production, on an average 10-hour shift, of over 6,000 yards.

Northwest 80-D dragline pulls clay and cemented material out of the deep lock excavation, emptying its 2½-yd. Hendrix perforated bucket into bowl of a Euclid S-18 scraper.

Short Hauls

Hauls were relatively short, however—less than one-half mile. Much of the material was waste. During the past year and a half a total amount of common excavation removed is estimated at 500,000 cubic yards.

The major slow-down or difficulty, during the excavation, resulted from a layer of blue clay. Here the equipment tended to lose traction. It repeatedly bogged down. At times, three D8's would be helping each scraper load, one pushing and two pulling.

The clay removal was speeded up

A DW21 scraper is pulled and pushed by D8's through slick blue clay in deep cut.

by bringing in a Northwest 6 dragline with a 2-yd. bucket, and a Northwest 80-D with 2½-yd. bucket, to load the scrapers.

The draglines were also used at the very bottom of the excavation where a tough cemented gravel was encountered.

Despite these minor delays, the total excavation program proceeded so efficiently that the water table was always kept lower than the excavation —a source of acute concern on this project.

Originally, skepticism was expressed in some quarters about the use of deep-well pumps to de-water the total excavation area, according to Robert Rothschild, president of Rothschild, Raffin & Weirick, Inc., the sponsoring firm.

"Now that we have completed the major excavation work of this project," Rothschild said, "I can affirm this method of de-watering such a large area has proved practical and economical, beyond our expectations. While during certain periods of rapid excavation the water table dropped slightly slower than our engineer had predicted, it always remained a few feet below excavation work. At no time has it interfered with or delayed our schedule."

CUTTING CAPACITIES UP TO 1 INCH 1-1/16 INCH, AND 1-1/2 INCH.

THE Morse-Starrett WIRE ROPE CUTTER

FAST
Especially designed cutting blade and dies of the finest steel assure fast cutting action.

EASY
Anyone can operate it. The hammer principle eliminates any special skill requirements.

SAFE
The enclosed cutting blade locked in the body of the cutter assures perfect safety.

PORTABLE
Models for tool kit or stationary operation. Made in three sizes.

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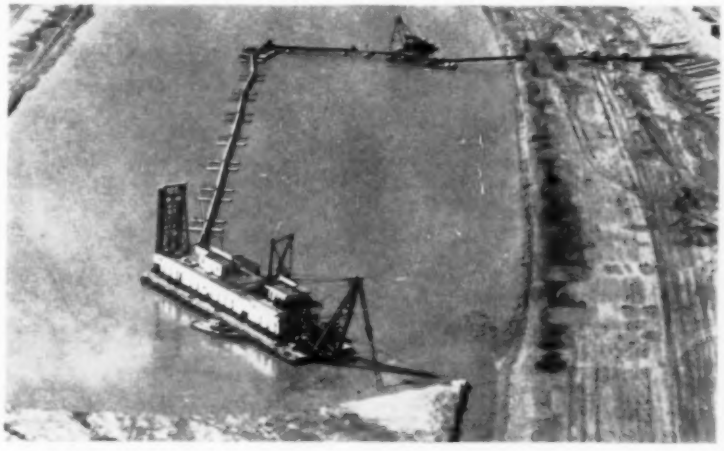


Dredge Cuts Ship Channel

A 30-in. hydraulic dredge is cutting a wide swath through California's rich Central Valley at the rate of 160 feet a day. Excavating a waterway 30 feet deep and 200 feet wide at the bottom, the *San Diego* is dredging the upper 7 miles of the Sacramento deep-water channel and the Lake Washington turning basin.

The work is being carried out by Pacific Dredging Co. for McCammon-Wunderlich Co., which holds a $7 million contract with the Corps of Engineers for excavation of 23,400,000 yards.

The *San Diego* is shown entering Lake Washington, where it is building a large triangular turning basin. With the cutterhead powered by a 1,000-hp motor and the main pump powered by a 4,000-hp motor, the dredge is moving a million cubic yards per month. The dredge's discharge line consists of 30-in. pipe—a total of 15,000 feet —furnished by the Los Angeles district office of L. B. Foster Co. Pipe sections averaging 39 feet long were specially constructed with tapered ends to engage couplings.

Personnel

Col. H. A. Morris is Sacramento district engineer of the Corps of Engineers, and Lt. Col. J. H. Sherrad is his assistant.

Haven Hart is chief of construction, operations division; Frank Kockis is chief of the engineering division; W. K. South is area engineer; and Wilmer Clark, Ralph Irving and W. H. Salmon are project engineers. Director of the Sacramento-Yolo port district is William Stone.

For Lock-Bridge Constructors, project superintendent is Bob Walker. Ross Potts is project engineer and Jeff McQueen is field engineer.

The CLEVELAND JS-30

WITH INSTANT LATERAL

DIGGING WHEEL POWER-SHIFTS 5 FEET FROM SIDE TO SIDE

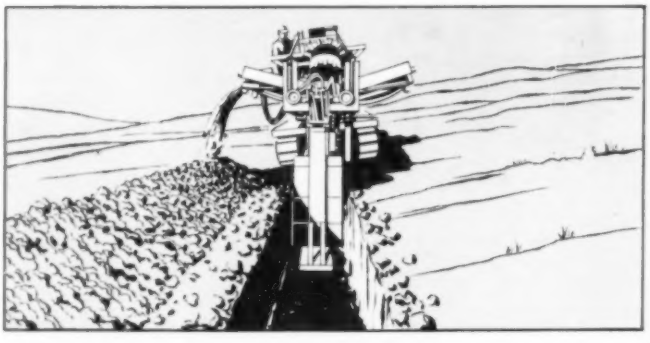
Digs trench behind either crawler or anywhere within its 6-foot width

Lateral shifting of the JS-30's wheel, up to 2½ feet to either side of center, is done hydraulically under lever control at operator's location, so trench can be dug at any point within 6-foot-wide path made by the crawler. Edge of 24-inch trench can be dug 5 inches outside either track, permitting trench to be flush with parallel pavement, curbs, sidewalks, etc. With wheel tilted, trench can be dug virtually flush with trees, poles, fences and other above-ground obstructions.

INSTANT DIGGING WHEEL TILT

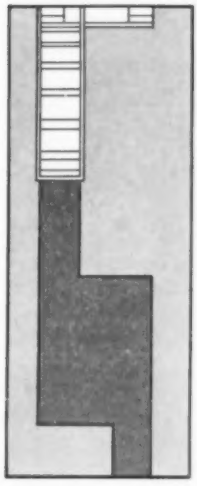
cuts blocking, cribbing costs

Hydraulic power-tilting of the JS-30's digging wheel to either side of vertical – a total tilting range of 14° – under lever control at the operator location, permits digging vertical trench on side slopes and in similar conditions with one crawler track on a higher level than the other. This eliminates the necessity of blocking, cribbing, etc. in such conditions. Power-tilt adds 7 inches to the outside cut of the digging wheel. This in combination with lateral power-shift permits digging trench virtually flush with above-ground obstructions.



—a trencher of amazing utility

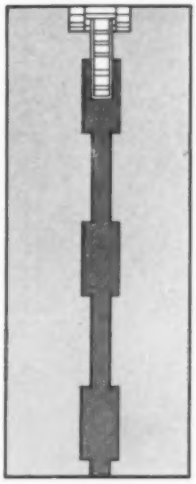
DIGGING WHEEL POSITIONING



EXCAVATES BELLHOLES

saves on trench width

Power-shifting and power-tilting of the JS-30's digging wheel are especially valuable in cutting trench to extra width required at pipe joints. This permits digging trench to narrow width except where bellholes are required. By utilizing power-shift the JS-30 can dig up to 6 ft. wide, down to 5½ ft. deep — reduces slower hoe-work to clean-up, etc.



PLUS THESE OUTSTANDING CLEVELAND FEATURES

- *Every* operation is automatic, completely controlled at operator seat.
- Hydraulic crumbing shoe raised and lowered under lever control from operator seat.
- Automatic conveyor shifting for side-to-side positioning.
- V conveyor for faster, higher, more efficient spoil discharge.
- Pulley-enclosed, dual conveyor drives, with instant belt speed and direction control.
- 33 positive non-slipping digging speed-and-power *combinations*.
- World's finest trencher crawlers, 1000-hour-lubricated.

DIGGING CAPACITY: 5 ranges, from 11" to 24" wide, to 5½' deep; to 6' wide with power-shift.

POWER: 370 cu. in. diesel—59 HP @ 1250 RPM.

WIDTH: 6' over crawlers; 7' 11" over conveyor.

HEIGHT: 8' 2" digging; 9' 5" roading.

LENGTH: 27' 3".

Pioneer of the Modern Trencher ®

The CLEVELAND TRENCHER Co.

20100 St. Clair Avenue • Cleveland 17, Ohio

Foundations for the vapor container are this thick concrete bowl and 24-in. rectangular columns. Wall footings and columns were also poured for the adjacent turbine structure.

'Hot Stuff' to Be Tested In Alaskan Climate

by E. L. Atkinson

Packaged nuclear power plant now being installed in Alaska will make Fort Greely army post less dependent on fuel-oil lifelines. Peter Kiewit Sons' Co. is prime contractor on the job.

INSTALLATION of small nuclear power plants in remote spots on the globe may soon provide a new source of contracts for heavy construction firms.

Among the first contractors to enter this somewhat specialized field is Peter Kiewit Sons' Co., Inc., the firm presently building the first nuclear power plant in the new state of Alaska.

Responsibility rides with these trailblazers. The Fort Greely contract has been described as an "experiment which could decide if the construction industry will handle nuclear plant construction in the future."

Cat No. 977 Traxcavator digs a saucer-shaped pit for the vapor container section of the Army Package Power Reactor. The nuclear plant will produce electricity and steam for heating. In background is present conventional power plant building.

(Left) Skilled welders join first ring to bottom of vapor container. (Right) Steel sections are positioned by crane with this sling.

The Alaska district of the U. S. Army Corps of Engineers has pointed out that award of this project is unique in the nuclear field. In the past, nuclear plants have been built in "package deals," with the firm handling design of the plant also acting as prime contractor, and guaranteeing performance.

The power plant for Fort Greely was developed by the Atomic Energy Commission, the Department of Defense and the Corps of Engineers. Specs of the design were written so that the plant components can be transported by air, and can be erected at a remote site within a six-month period. Because of these features, the plant has been called the "Army Package Power Reactor."

Uranium Fuel

Its power is derived from the fissioning process—by which a huge amount of heat is produced by a very small quantity of enriched uranium fuel, commonly referred to as "hot stuff."

Here's a look at the lop-sided results. Engineers estimate that 24 million pounds of coal would be required during one year's operation of a coal-burning power plant to generate an amount of heat equivalent to the nuclear plant's output. Nuclear fuel consumed in the same period of APPR operation would be only about eleven pounds—and it can be airborne.

At the present time, drawn-out resupply missions carry thousands of tons of fuel oil to remote sites. The use of APPR's would make vital Arctic stations less dependent on tricky supply lines. Fewer tankers would be needed for shipping, and fuel storage problems would be simplified.

The story of the Fort Greely APPR is a sequel to the successful development of the prototype plant at Fort Belvoir, Va. Army engineers there decided to build another APPR plant, this time out in the field.

This project was assigned to the Alaska District. A design contract for the second reactor was awarded to Alco Products, Inc.—formerly American Locomotive Co.—the firm which produced the prototype plant.

The Fort Greely army post was selected as site for the field unit because it could operationally test the plant under extreme cold weather conditions, and yet be readily accessible by air and highway.

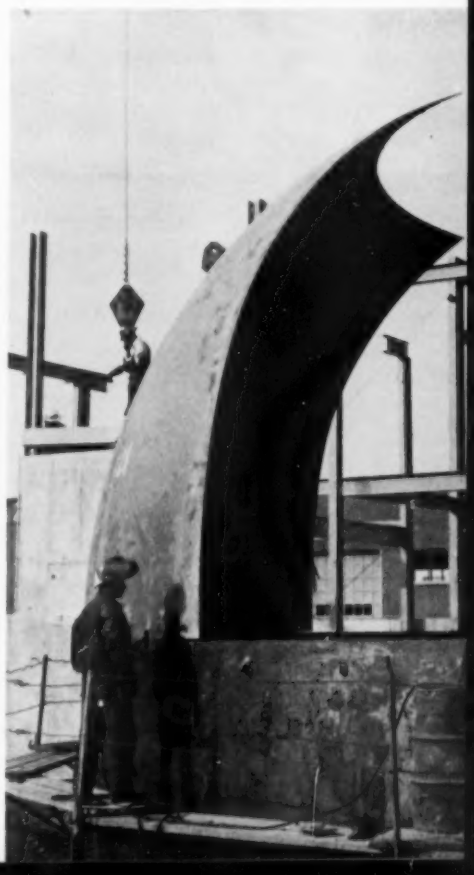
Located at the junction of the Delta and Tanana rivers in low-rolling hills, Fort Greely is on the Alaska highway, about 100 miles south of Fairbanks.

The temperature there hits extremes. In winter, the thermometer has sagged as low as minus 63° F. In summer, it spurts up into the nineties.

Also at Fort Greely is the cold weather and mountain training school for Army troops in Alaska, and the Arctic test branch which conducts cold weather field tests of all types of military equipment.

The power plant construction contract was awarded under competitive bidding to the Kiewit firm, and actual work got underway last year.

First phase of the work was to clear ground, excavate and start the structural erection, which occupied ap-



Welder with torch and rod is ready to start on first section of the top hemisphere.

proximately 15 men on the average, for a period of six weeks.

After the site was level and clear, compaction tests were made to determine bearing capacity. Essentially, two buildings were to go up. One was a steel-frame building covered in metal panels for the generating equipment. The second was a connected silo-shaped, dome-covered structure of metal and concrete for the "hot" parts.

The turbine building, including the vapor container and the "spent fuel pit" structure, measures 96 feet by 94 feet. There are also two well houses enclosing pumping equipment for the 18-in. diameter wells that supply cooling water for the turbine condenser. Certain run-through connections were required; also placement of concrete, welding, carpentry and equipment handling.

Concrete work included the 8-in. foundation walls with spread footings to 12 inches. The column footing for the 16-in. steel 1B columns are 24 inches by 24 inches. Also using concrete was a vapor container excavation in the shape of a saucer, which ran 16 feet deep and 40 feet in diameter.

Concrete was purchased from a supplier, who set up a batch plant at the post within one mile of the project, and delivered to the job in Jaeger transit-mixers. About 2,800 cubic yards are required.

Perhaps the most fidgety phase of the program was welding and installation of the vapor container sections, its liner and the pouring of the concrete base.

Hemisphere was welded together in place, tested and then removed for storage awaiting completion of the unit's interior. A crawler crane gently removes the dome.

Erection of the dome-topped structure was carried to a point, at which the reactor vessel, pressurizer and steam generator were placed inside; then the dome was put in place.

A 38-B crawler crane set the curved pieces of the vapor container and held them in place until the sections were tightly clamped prior to welding.

Carl Eilertson, resident engineer for the Engineer District, said that the heaviest piece moved by the crane was the access tube connected to one of the curved sections, weighing approximately 16 tons.

The reactor vessel itself weighs 19 tons. To place this, and also the pressurizer and steam generator components, a special bit of contractor ingenuity came into play.

Traveling Crane

A structure was erected on the top of the vapor container walls which supported a traveling crane. This structure extended over the side of the walls far enough to lift the large components and clear the walls. The equipment was lifted clear of the top of the vapor container. The traveling crane then rolled to a point over each unit's position in the container, and lowered into place.

The heavy weight and the boom angle necessary prevented use of a crane on the ground to place these units.

Other units to be installed will be small enough to be carried through the 6-ft. access door opening.

After installing the above units and shielding rings around the reactor vessel, the contractor set the steel dome in place on top of the vapor container. The hemispheric top had first been welded together in place,

Concentric circles of reinforcing steel are placed in the bottom bowl of the vapor container prior to concrete placement.

tested, then removed for storage until the bottom section of the vapor container was in place.

The dome was attached immediately because it was necessary to protect the interior of the structure from the winter elements. But, a 4-ft. concrete ceiling shield is yet to be poured on the inside chamber. This could not be done prior to installing the dome because of the recent carpenters' strike throughout Alaska which prevented the erection of the form work.

However, the contractor will accomplish this at a future date by introducing the concrete through an access opening in the shell above the ceiling elevation.

A dozen welders handled the job of one-half mile of welding in the vapor container shell and liner plates. Many more uncounted feet of welding were needed for piping and the liner of the spent fuel pit. The work was divided, with some welders on structural parts, some on pipe work.

The contractor had to observe some techniques different from ordinary construction practices.

One example is the degree of cleanliness required in the final installation of the primary vessels and stainless steel piping of the primary loop. The heli-arc welding procedure in welding the primary loop components also requires a special skill and ability.

There are NO tolerances in this assembly. Everything must fit perfectly with no provisions for adjustments. Competent welders skilled in this type of welding were scarce and had to be specially trained.

With this exception of special welding techniques, standard construction practices have been followed in the entire installation. But, extra-careful handling has been required as protection against damage and soiling of the nuclear equipment.

The project is scheduled for completion by July 31. When the tools are laid away and the APPR starts to hum, it will be actually "hot stuff" challenging Alaska's Arctic cold.

Produces Steam

In operating language, here's how it works.

The reactor is placed in a tank submerged in water. Pressurized water circulates through the reactor, is heated and passes to a heat exchanger where it transfers the heat to a secondary loop of water. The secondary water is converted to steam; this drives the turbine-generator which produces electricity.

The Fort Greely plant will produce 42 million BTU in steam for space heating, and about 1,700 KW of electricity, sufficient for a town with a population of 2,000.

When Alaska's first nuclear plant is completed and tested, it will be turned over to the U. S. Army for regular operation.

Peter Kiewit Sons' Co., Inc., of 1300 Aloha St., Seattle, was one of eight pre-qualified bidders for putting up this power package. Its proposal, the lowest, aggregated $4,897,-217. The government estimate was $4,907,899.

The Kiewit firm has had an outstanding record for all its Alaska work. It has been cited for the best safety record of any firm doing military construction work in the entire north Pacific division of the Corps of Engineers.

The Kiewit firm, whose main headquarters are in Omaha, Neb., has had wide experience in the field of nuclear construction. It participated in building of the AEC plant at Portsmouth, Ohio, under a $1 billion contract.

Widely experienced in Alaska, the firm constructed Army Nike sites, built a power and heat plant and has completed over $96 million in Alaska construction in the last decade.

Charles Campbell is general superintendent at the Fort Greely project, and William Seitz, superintendent of building.

Bob Williams is superintendent, and Bob Novak is welding superintendent of Rainier Mechanical Co.; Frank Fish is superintendent of the Grasle Electric Co. Both firms are sub-contractors. Chicago Bridge and Iron Co. sub-contracted erecting the vapor container.

Alco Products, Inc., which held the design contract for the Fort Greely plant, is a sub-contractor to the Kiewit firm for supply of the plant's primary system.

The Fort Greely APPR plant is on schedule despite an unusually wet construction season last year, harassment of a work delay during an 11-week-long carpenter's strike, and delays caused by a herd of curious shaggy buffalo.

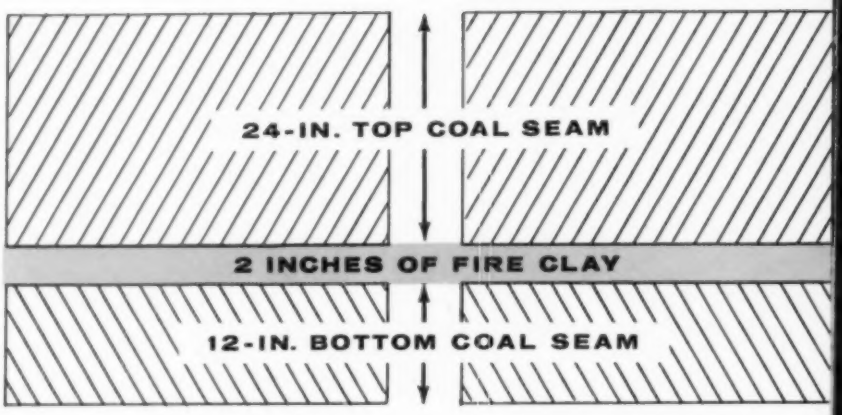
There had to be "buffalo breaks" when time was taken to shoo herds from the site. But the creatures have wildlife rights—the fort is adjacent to a famed Alaska buffalo range.

It might be symbolic that the buffalo feel an affinity for the package plant. The powerful APPR, like the buffalo, packs a mighty wallop in a compact frame.

Mass concrete is placed over skeleton of rods with the aid of a laydown bucket.

How KIRKVILLE COAL COMPANY solved split coal seam problem

and reduced ash content with SKOOPER loading...



Study the diagram. You'll quickly see the coal-clay-coal loading obstacle at one of Kirkville Coal Company's open pit mines in Missouri, near the Iowa state line. The 2-inch layer of clay splits a 36-inch vein of high-quality bituminous coal. Mixing in clay during coal loading causes too high an ash content . . . lowers B.T.U., and reduces market price.

As President C. E. Hanson puts it:

"Split veins in this area have always made it all but impossible to remove coal without getting a high percentage (7 to 8%) of ash due to the clay seam. Standard shovels with coal-digging buckets heeled into the clay, while tractor-type and 4-wheel-drive front-end loaders constantly dug into the clay with their tractive systems."

He further reports . . .

"Koehring Skooper proved to be the ideal machine for the job. With its 7-foot level crowd, clean coal can be shaved off *with 2% less ash.*" What's more . . . Skooper's powerful break-out force, coupled with level crowd action, makes digging the coal an easy job. Consider this, too . . . Skooper's 2-yard bucket (on basic ½-yard machine) takes full advantage of only 64 horsepower . . . makes the most efficient use of the little fuel it consumes! That's because, with Skooper's unique "stand-still" loading cycle, full engine power is concentrated on the digging effort . . . and not on unnecessary traveling.

5 months with no down-time

"Since the start of our busy season 5 months ago, the Skooper has worked 8 hours a day, at least 5 days a week without a single hour's down-time," Mr. Hanson reports . . . and adds, "For coal digging and loading, I feel that it's the most efficient equipment on the market!" Isn't it time *you* tried Skooper? Call Koehring distributor, or write us about it today.

KOEHRING

DIVISION OF KOEHRING CO.

Milwaukee 16, Wis.

There's nothing like it — on wheels or tracks!

Koehring 1205 strips Kirkville coal

Working just ahead of Skooper at 3,000-acre Kirkville mine, this Koehring® 1205 is stripping approx. 24 feet of overburden. Materials range from common earth and clay to shale and ledge rock. 1205 output? About 4300 yards per 16-hour day! It's equipped with 3-yard dipper on 40-foot boom, 30-foot stick . . . has been stripping at Kirkville mines for over 2 years. K24

MAKES 7-FOOT LEVEL CUT... SWINGS, LOADS OUT... WITHOUT MOVING TRACKS!

KOEHRING® SKOOPER

KOEHRING HEAVY DUTY

News from the Field

Maryland-Delaware Toll Road Proposed

Maryland has joined the ranks of states which are actively seeking means of speeding up the schedule for construction of portions of the interstate highway system. The Maryland Roads Commission has authorized preparation of engineering and traffic studies for the Northeastern Expressway between Baltimore and the Delaware state line with a view toward constructing it as a toll road in the next three years. Building the road as a part of the interstate program would mean completion in the 1970's, Commission Chairman-Director John B. Funk said. Delaware is considering building its section of the same highway as a toll facility.

E. O. Larson Joins Consultants Firm

Ernest O. Larson, one of the nation's leading reclamation engineers, has joined the consulting engineering firm of Berger Associates as its chief consultant. He will be located at the firm's Salt Lake City (Utah) office.

The Berger group of companies has offices in Orange, N. J.; Harrisburg, Pa.; Salt Lake City; Geneva, Switzerland; Paris, France; Bonn, Germany; and Rangoon, Burma.

Larson recently retired from the U. S. Bureau of Reclamation after 37 years of service. His last post was director of the Bureau's region 4 at Salt Lake City. He was a pioneer in reclamation work and contributed materially to the development of the water resources of the Upper Colorado River basin.

One of the major phases Larson planned and supervised during his long federal service was the billion dollar Colorado River storage project which has assured development and use of the limited water resources in the upper basin. He was widely acclaimed within the industry for this work.

A graduate of Utah State Agricultural College with a master's degree in civil engineering, Larson was cited by the Department of Interior in 1956, and received its distinguished service award.

Wide World Photos

A working model of a giant coal stripping shovel is presented to President Eisenhower at the White House by F. Stillman Elfred, chairman of the National Coal Association.

Eisenhower Gets Scale-Model of Big Stripping Shovel

Two leaders of the nation's bituminous coal industry paid a call recently on coal's No. 1 customer—President Eisenhower.

F. Stillman Elfred, chairman of the board of National Coal Association and Peabody Coal Co., St. Louis, and Stephen F. Dunn, president of National Coal Association, told Mr. Eisenhower during a White House visit that the federal government buys 30 million tons of coal a year. This is far more than any other single purchaser.

The four main government heating plants in Washington burn some 315,000 tons of coal a year to warm the White House, Capitol and other federal buildings, Dunn pointed out.

"We are particularly proud of this because Washington is properly recognized as one of the cleanest, most beautiful cities in the world," Dunn said.

Elfred presented to the President a scale model of the largest mobile land machine on earth—a coal stripping shovel now under construction at the Bucyrus-Erie Co. plant in South Milwaukee, Wis. The giant shovel was ordered by the Peabody Coal Co. for a new mine in western Kentucky which will supply a big new TVA generating station. The machine will be about as tall as a 20-story building from the ground to the tip of the boom. Its 115-yd. dipper will pick up 173 tons of earth and rock at each bite.

"This shovel is typical of the billion-dollar investment which the coal industry has made in new machines and facilities," Elfred said. "It demonstrates graphically that the coal industry intends to continue to make an important contribution to the nation's welfare."

The coal industry leaders stressed to Eisenhower that large reserves of coal will be available to the nation in the future for delivery by rail, water or truck wherever needed. They also described coal as an important commodity which has resisted inflation.

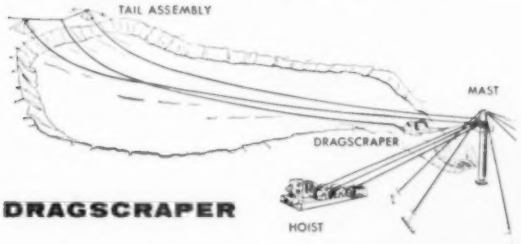
"The average cost of coal at the mine actually has fallen 13 cents a ton from 1948 through 1959," Elfred

Continued on page 46

Cut Materials Handling Costs in Half . . . Dig *and Haul* with a Sauerman Machine

Operating costs as low as 6¢ per ton are reported by Sauerman DragScraper and Slackline Cableway owners. This cost includes labor, power and maintenance when digging free-caving material on average haul distances.

When you use a Sauerman DragScraper or Slackline Cableway, one machine does *both* digging and hauling from deposit to plant. No double handling is required. You cut labor and equipment costs in half—or even more—because a single Sauerman Machine, controlled by one man, replaces the multiple equipment needed for other methods.

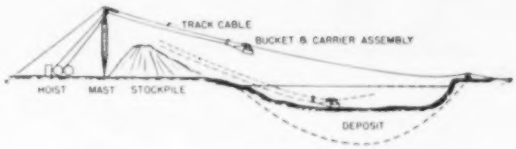


DRAGSCRAPER

DragScrapers are usually recommended for bank or pit deposits. They dig from hillsides or underwater as easily as on level ground and can haul directly to hopper or field conveyor. The Sauerman DragScraper hoist is designed for continuous duty and many years of service. The operator's control station may be remotely located for maximum visibility of deposit and plant.

DragScrapers are built in sizes from 1/3 to 15 yds. to satisfy practically all tonnage requirements.

SLACKLINE CABLEWAY



When deep digging is required or anticipated in the future, a Sauerman Slackline is usually best for the job. This powerful excavator can dig 100 ft. below water, lift its load and deliver the material to a stockpile on a 1000-ft. span.

The Slackliner Bucket inhauls at high speed and dumps automatically. Dumping point is determined by a stop button on the track cable. Gravity returns the bucket to the digging point, completing the fast operating cycle.

The use of a stockpile permits a single 2-yd. Slackline Cableway to handle the material requirements of a 200-tph. plant. Slacklines are built in sizes up to 3½ cu. yds.

★

Find out how you can save with a Sauerman Machine. Write or call, giving tonnage requirements and a description of your deposit. Sauerman engineers will supply their recommendations on the most economical machine for you.

SAUERMAN BROS., INC. 622 SOUTH 28TH AVENUE • BELLWOOD, ILLINOIS
Linden 4-4892 • Cable CABEX—Bellwood, Illinois

CRESCENT DRAGSCRAPERS • SLACKLINE AND TAUTLINE CABLEWAYS • DUROLITE BLOCKS

FOR 50 YEARS...
Finest in the Field!
Rely on the bucket contractors rely on. The Omaha Dragline Bucket gives full load with every cast. Perfect balance makes it easy to spot dump. Alloy steel cutting teeth stay sharp, tough and ready. Strike pay dirt now! Complete information and specifications await your letter.
DRAKE-WILLIAMS MOUNT
• OMAHA, NEBR. •
OMAHA
DRAGLINE BUCKETS

News . . .

Continued from page 44

said. "In terms of constant dollars, discounting the inflation that has beset other commodities, this means the cost of coal at the mine has fallen 21.4% in a dozen years.

Bituminous coal producers pay out in wages about half of the $2 billion they receive from coal sales annually, and coal miners as a group are the highest-paid industrial workers in the world, Elfred informed the President. Coal is the biggest revenue producer for the railroads, the principal source of fuel for the nation's electric power, and is essential to the making of steel, he said.

The President indicated to Elfred and Dunn that he would place his miniature shovel in the Eisenhower Museum at Abilene, Kan. The gift model, scaled to about 1/200th the size of the actual coal stripper, was built of aluminum and wood by the manufacturer's engineering research department. The model was flown from Milwaukee to Washington, personally escorted by a Capital Airlines stewardess.

Thunderstorm Safety Idea

Contractors can get advance warnings of approaching thunderstorms by a very simple procedure, according to a recent construction safety bulletin issued by the National Safety Council, Chicago, Ill.

Spring and summer thunderstorms develop quite rapidly under certain atmospheric conditions. Weather forecasts advise of such conditions and the possibility of electrical storms, but their approach generally is heralded only by observance of cloud formations or by the sound of distant thunder.

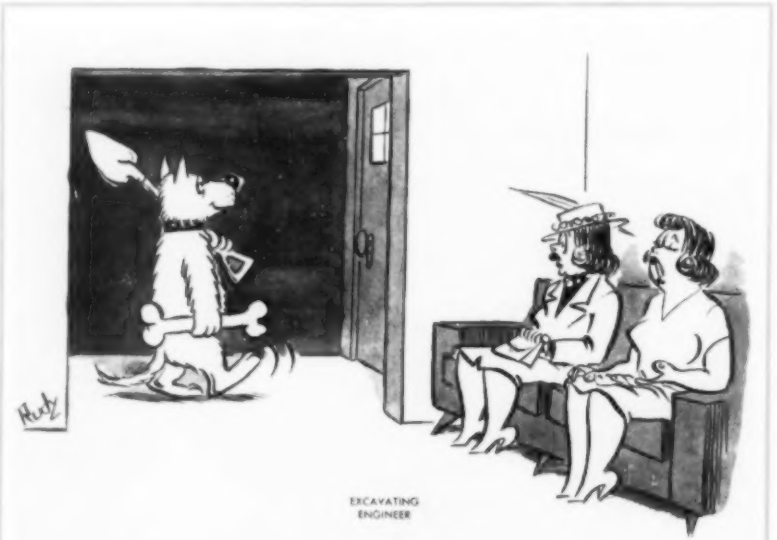
All too often, close proximity of a storm to a construction site does not allow sufficient time for construction employees to stop work and to vacate areas made hazardous by lightning. Advance warning of an approaching electrical storm is desirable.

An ordinary AM (not FM) radio or automobile radio will provide advance warning if properly tuned and located so that its crackling will be within hearing range. The radio should be tuned as follows:

1. Set the dial to a frequency where no station is heard so that programs will not hide the noise of static.
2. Turn the volume up to a point where the crackling of static discharges can be easily heard.

The audible crackling of static discharges will provide advance warning of the approaching electrical storm, and allow the employees to discontinue operations like blast hole loading, and take proper cover.

Radios used for this purpose in underground operations should be equipped with outside antennas.



"... and talk about intelligence!"

400,000 miles without failure on their first LaCrosse Trailer– Matson, Inc. owns 11 now

Matson, Inc. has traveled 400,000 miles with the above LaCrosse Lowbed, hauling such loads as this 25-ton scraper. Never a failure since the trailer was put in service in 1954.

This huge quarry truck was hauled from near Boston, Mass. to Iowa City, Ia. on a LaCrosse Lowbed. Annually, Matson's 11 LaCrosse trailers each average 80,000 miles.

Loren Baker, Superintendent
MATSON, INCORPORATED

Rarely does a trailer manufacturer have the opportunity to dramatize product quality—yet, the very factor that permits LaCrosse owners like Matson, Inc. to establish such outstanding performance records as the following—stems from such quality . . .

Loren Baker, superintendent of this Cedar Rapids hauling firm, says: "We bought our first LaCrosse lowbed trailer in 1954. It has seen over 400,000 miles service and we've never put a weld on it.

"We're racking up more than 800,000 miles per year on our *11* LaCrosse trailers, hauling power shovels, scrapers, tractors and rock crushing equipment into 39 states. Haven't had a failure on any yet.

"Besides, the gooseneck is low, so that a big scraper can be easily hauled in conformance with the 13′ 6″ clearance regulation in most states.

"Big tail lights, smooth hauling characteristics are other features we like."

Matson purchased 5 LaCrosse Trailers in 1959 . . . kind of like betting on the winning horse.

Facts like these show why LaCrosse Trailer sales zoomed 40% in 1959. Each is backed by a full one-year warranty in writing. Here's how to get complete information.

LaCROSSE

LEADERS IN LOWBEDS

LaCROSSE TRAILER CORPORATION

418 Gould Street • La Crosse, Wisconsin

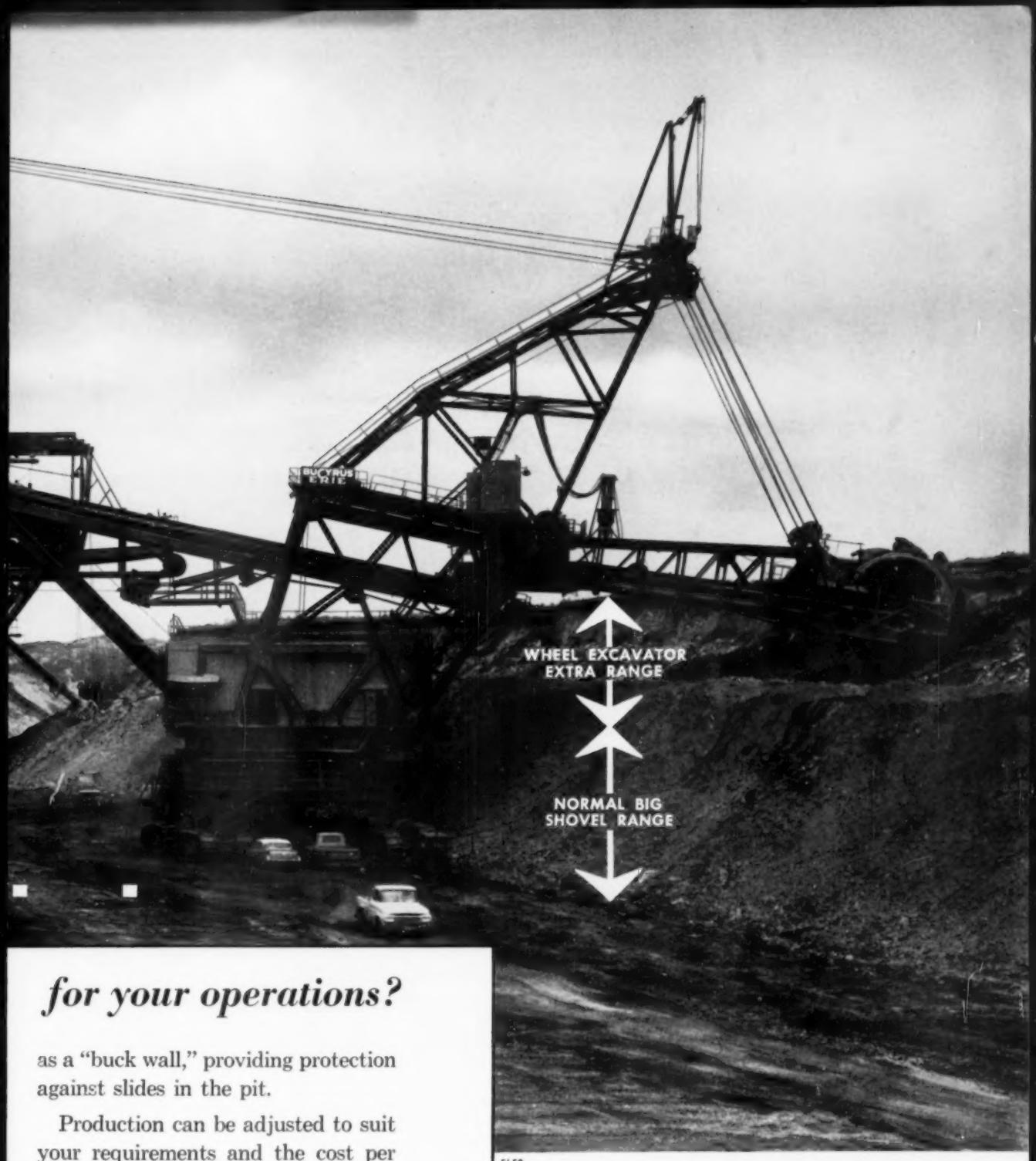
MEET THE WHEEL EXCAVATOR .

...have you considered this revolutionary machine

Take a close look at the unique abilities of the Bucyrus-Erie wheel excavator. Perhaps it is the answer to your large-scale excavating, stripping and high-volume dirt-moving problems.

In the coal fields for example, Bucyrus-Erie wheel excavators team up with present big shovels and make it possible to uncover veins previously too deep for practical stripping... thereby increasing strippable reserves and extending the use of present equipment.

The "wheel" can deposit the unstable material, normally occurring near the top of a mine cut bank, far back onto the spoil pile. The stripping shovel places the more stable material from the lower part of the bank at the bottom of the spoil pile where it acts



for your operations?

as a "buck wall," providing protection against slides in the pit.

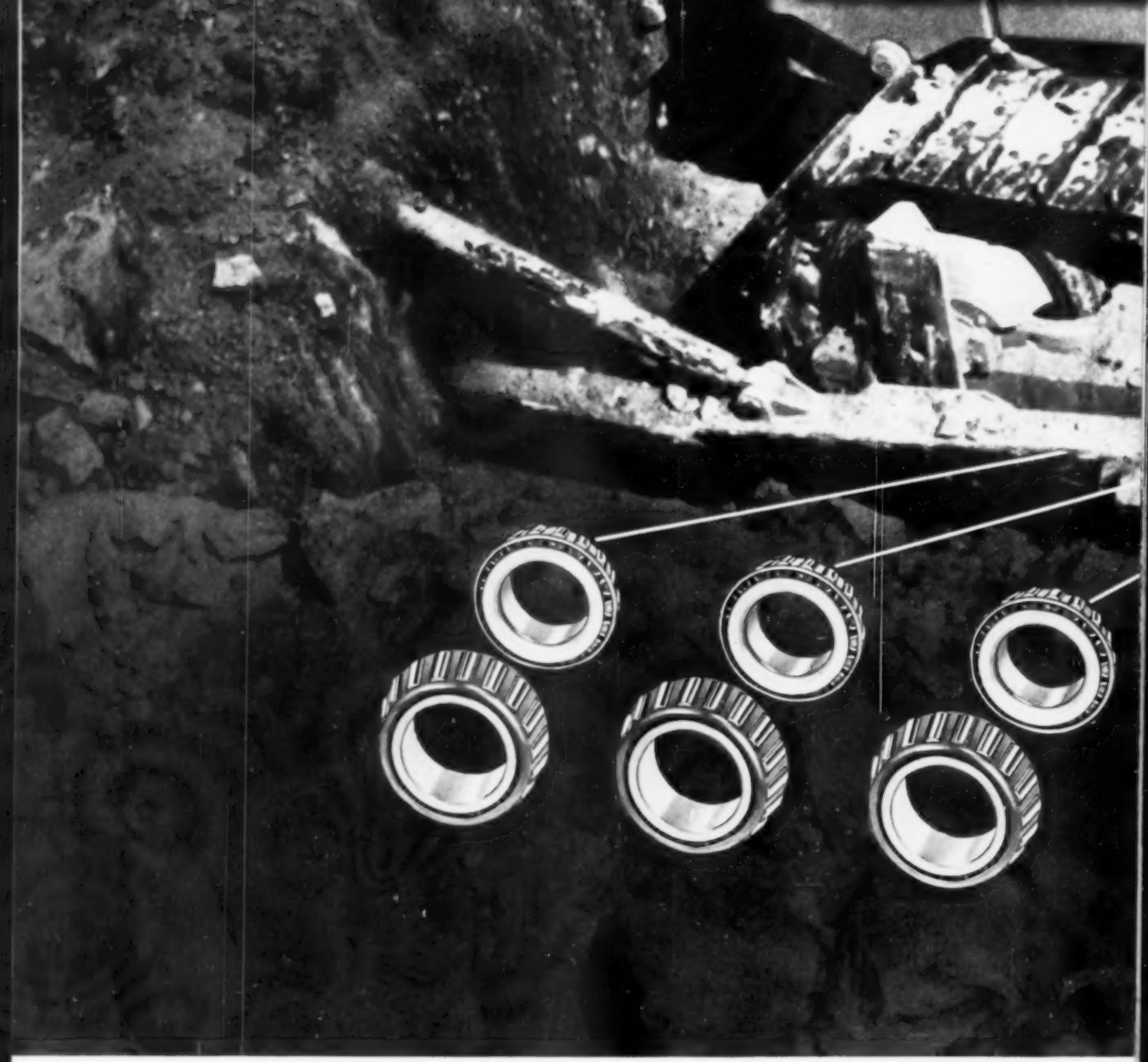
Production can be adjusted to suit your requirements and the cost per cubic yard of material dug is lower than by any other method.

For details on how a wheel excavator may be applied to your operations consult Bucyrus-Erie Company, South Milwaukee, Wisconsin.

5L59

BUCYRUS ERIE®

Builds Better Equipment



MORE WORK POWER

Reduced friction through use of tapered roller bearings in all Allis-Chalmers crawler tractors makes the difference in work power and profit for you!

All Allis-Chalmers crawler tractors roll on tapered roller bearing truck wheels. Most others still use bushings.

Anyone who remembers his roller skating days knows the performance advantages of bearings over bushings. The difference between first and also-ran was in the wheel bearing. This friction-reducing advantage is the reason railroads all over the country have turned to *roller* freight.

The same principle applies to tractors except much more power is being wasted by friction-type plain bushings. It's one of the reasons the 225-hp HD-21, on tapered roller bearings, produces right alongside the biggest tractors you can buy. Can you

move ahead with

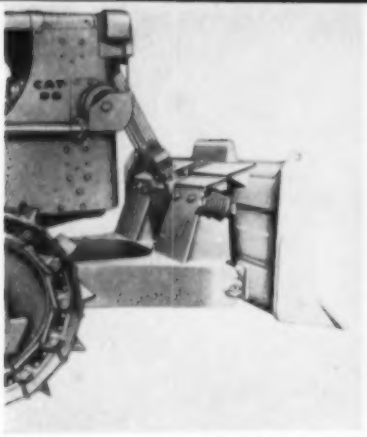
PER HORSEPOWER

continue to pay for power that *never* produces—that gets "lost" in old-fashioned bushings?

Your Allis-Chalmers dealer will be glad to discuss this and the many other advantages that keep the HD-21 on the go shift after shift with a minimum of maintenance. Ask about the *toughest track ever built . . .* the *industry's healthiest engine* and *certified permanent lubrication*. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wis.

ALLIS-CHALMERS

power for a growing world



Pushloading tools are (left) inside-mounted cushion dozer; (center) cushion push block; (right) rear-mounted tandem pusher C-frame.

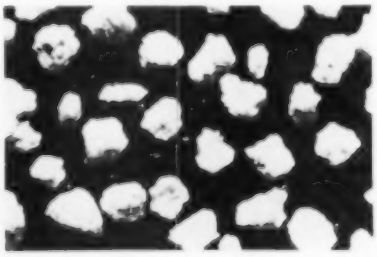
Equipment You Ought to Know About

AN Pellets

Manufacturer: Explosives Div., Atlas Powder Co., Department EE, Wilmington 99, Del.

Claims: Ammonium nitrate in a new pellet form increases the economy and effectiveness of AN blasting, according to Atlas.

Produced at a recently completed plant near Joplin, Mo., the pellets are described as the optimum size and



shape for better control over borehole density and oil absorption. Their porosity allows them to readily absorb sensitizing agents as fuel oil.

Atlas pellets are available in 50 and 80-lb. moisture-resistant bags. The pellets flow freely and may be field-mixed by any method. They will also be available in pre-mixed form.

Pushloading Tools

Manufacturer: Caterpillar Tractor Co., Department EE, Peoria, Ill.

Claims: Three new products have been developed by Caterpillar to increase pushloading production and reduce pit cycle time.

Two of the new tools—the inside-mounted No. 9C cushion-dozer and the case-mounted cushion push block—permit approach and contact of push tractors at relative speeds up to 3 mph. The third tool—the rear-mounted tandem pusher C-frame—is designed for use on tractors equipped with standard bulldozer blades.

Both the No. 9C cushion-dozer and the cushion push block are built to absorb the shock of push-tractor contact with scrapers at higher-than-normal speeds. A considerable increase in production can be obtained by making contact at these higher speeds, numerous field studies by Caterpillar have shown.

The No. 9C is available for the D9E tractor only, and the cushion push block can be mounted on either the D9E or D9D tractors. Tandem pusher C-frames are available for both the D8H and the D9E tractors.

The specially reinforced No. 9C bulldozer blade, which is 10 feet 11 inches wide, can also be used for many dozing applications. Available with either front or rear-mounted cable control units, the No. 9C is a solidly braced unit when used for bulldozing. This is because of a special pinning arrangement where the force of dozing pulls the blade against heavy-duty metal stops on the cushioning spring bolt.

Cushioning of the No. 9C cushion-dozer is done by four rubber springs, each made up of eight rubber discs. Springs are assembled with a preload of 1 inch (7,200 pounds preload) and will compress 2½ inches (93,000 pounds plus) before bottoming. The dozer is mounted to heavy-duty push arms through a connecting box section of heavy steel plate. Push arms are in turn welded to a heavy-duty crankcase guard.

The case-mounted cushion push block is cushioned by four rubber springs, each with 16 rubber discs, giving a total of 64 rubber discs. Springs are assembled with a preload of 2 inches (8,000 pounds preload) and will compress 6 inches (110,000 pounds) before bottoming.

Trunnions of the rear-mounted tandem pusher C frame bolt directly to the track roller frame behind the bulldozer trunnions. The assembly is supported at the rear by the tractor drawbar. Advantage of the pusher C-frame is that it transmits pushing force from a second tractor through the track roller frame to the dozer push arms.

Transit-Railer

Manufacturer: Bucyrus-Erie Co., Department EE, South Milwaukee, Wis.

Claims: A carrier-mounted crane-excavator designed for multi-purpose railroad use is called the Transit-Railer. It is equipped with both rubber-tired and flanged, guide rail wheel mountings for combined on-track, off-track operation.

Rated as a 10-ton crane, it can be converted to a dragline, clamshell, hoe, or shovel front end.

The Transit-Railer can be used *on* tracks or for construction and maintenance work.

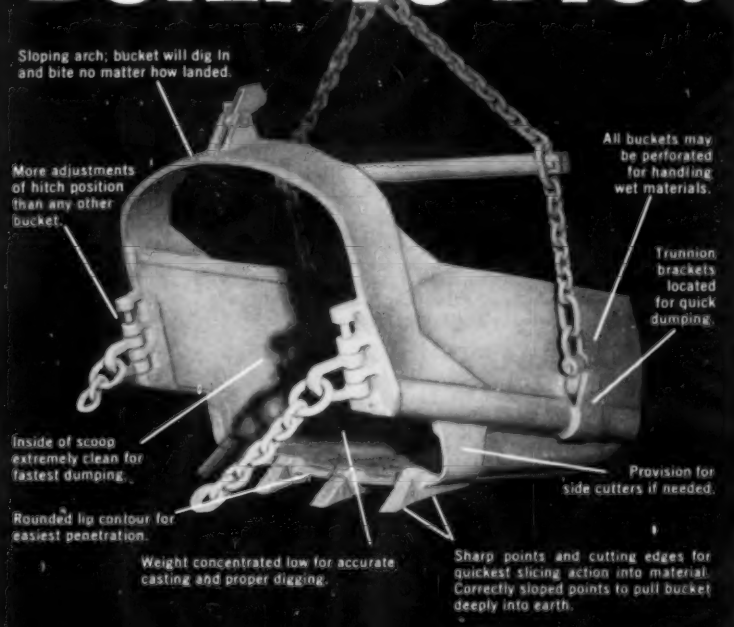
Off the rails, it can be used as a normal over-the-road crane-excavator—for yard work, materials handling, truck transfer operations at warehouse depots and scattered sand-gravel pits.

The machine is basically an 11-B Transit Crane mounted on a 6x6 carrier to which two sets of heavy-duty flanged guide rail wheels are attached. The rail wheels are roller bearing mounted on telescoping structural steel legs which can be raised or lowered into position.

Features available for railroad service include: five-speed full reversing transmission plus 2-speed auxiliary transmission; hydraulic power steering; remote control of carrier from operator's cab; tire load indicators; rail clamps (two per side for use on trestle work); steering lockout; front

Continued on page 55

BUILT TO DIG!


Sloping arch; bucket will dig in and bite no matter how landed.
More adjustments of hitch position than any other bucket.
All buckets may be perforated for handling wet materials.
Trunnion brackets located for quick dumping.
Inside of scoop extremely clean for fastest dumping.
Provision for side cutters if needed.
Rounded lip contour for easiest penetration.
Weight concentrated low for accurate casting and proper digging.
Sharp points and cutting edges for quickest slicing action into material. Correctly sloped points to pull bucket deeply into earth.

WILLIAMS

Durable clamshell and dragline buckets for every application

Williams Bucket Division, The Wellman Engineering Company, 113 St. Clair Ave. N.E., Cleveland 14, Ohio

SEND FOR FREE CATALOG

WILLIAMS BUCKET DIVISION A-2
The Wellman Engineering Co.
113 St. Clair Ave. N.E., Cleveland 14, Ohio
Please send me the new Williams Bucket catalog.

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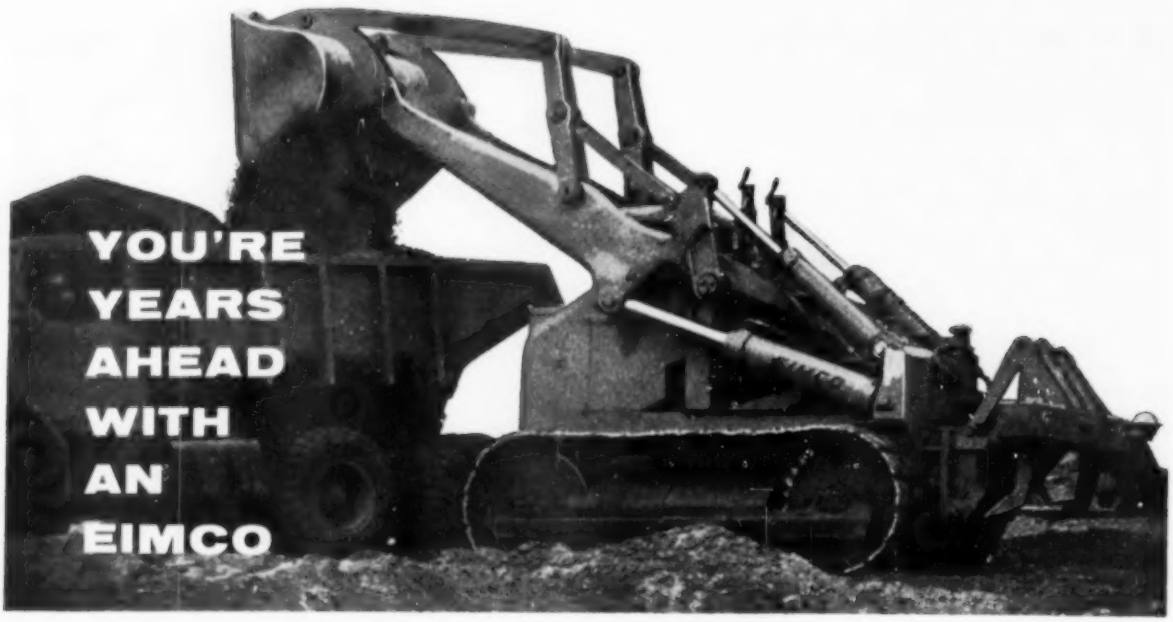


Eimco Crawler-Tractors Give You Today What Others Can Only Promise for Tomorrow

Power Shift

Eimco's patented, unique "Unidrive" transmission lets you shift from one speed to another, forward or reverse, at any engine or tractor speed or load. Features gears that never reverse rotation! Heavy duty single stage torque converter is standard equipment.

Independent Track Operation

Eimco's patented Dual Final Drives give you "flip-of-the-lever" control over each individual track for true spin, as well as normal brake, turns.

Full Track Oscillation

Eimco's patented alloy-steel equalizer bar permits full track oscillation, even with attachments, for greater stability and safety.

AN OPERATING RECORD OF 70% SAVINGS IN MAINTENANCE COSTS!

A Full One-year Warranty Against Any Defects in Workmanship and Material on every Eimco Tractor, Tractor Unit and Transmission!

True Cockpit Visibility

Eimco's exclusive up-front operator position means the operator can see his work as he approaches it for greater control, safety and work output with no stretch, squint, squirm . . . less operator fatigue.

Anti-Friction Bearings

In every track roller and idler . . . each bearing in separate cage to maintain accuracy, longer life, and ease of maintenance.

Power Take-Off

Standard SAE specifications for take-off and drilling. Shaft runs continuously and is not affected by track operation.

Step Up Your Work and Profit . . . with the modern, efficient

Eimco 103	Eimco 105	Eimco 106
100 HP DIESEL	143 HP DIESEL	205 HP DIESEL

Tractors — Dozers — Excavators — Front End Loaders — Log Loaders — Special Steel Mill Excavators and Front End Loaders

"ADVANCED ENGINEERING AND QUALITY CRAFTSMANSHIP SINCE 1884"

THE EIMCO CORPORATION

B-516

EXPORT OFFICE: 51 - 52 SOUTH STREET, NEW YORK, N. Y.
BRANCHES AND DEALERS IN PRINCIPAL CITIES THROUGHOUT THE WORLD

EIMCO

TRACTOR LOADER DIVISION

634 SOUTH 4TH WEST
SALT LAKE CITY, UTAH — U.S.A.

New Equipment . . .

Continued from page 53

and rear guide wheel guards; and four outriggers.

Basic features of the standard 11-B are also incorporated.

Compact Trailer

Manufacturer: International Harvester Co., Department EE, 180 N. Michigan Ave., Chicago 1, Ill.

Claims: International's No. 95 low-bed four-wheel trailer has a 9,500-lb. rated capacity and a shock absorber wheel suspension. It is designed for in-the-field and on-the-highway hauling of tractors and construction machinery.

Rubber-mounted torsion axles act as a combination spring and shock absorber, and work equally well whether the vehicle is loaded or empty. Independent oscillation of each wheel makes movement of the trailer smooth when pulled over rough terrain or at normal highway speeds.

Harvester's single-unit welded steel frame gives stability to the trailer bed, which consists of 2-in. unfinished wood. A ramp for one-man loading and unloading operations also serves as the unit's tailgate.

Over-all width of the No. 95 is 8 feet; over-all length, 19 feet. Bed width measure 76¾ inches; bed length, 14 feet. The basic machine weighs 1,600 pounds.

Two and four-wheel electric brakes are offered as optional equipment. A complete electric kit, which includes tail and indicator lights, an emergency brake switch and battery, is available.

65-Ton Capacity Crane

Manufacturer: Manitowoc Engineering Corp., Department EE, Manitowoc, Wis.

Claims: A large-diameter, wide roller path and extra strong king pin eliminate the need for hook rollers on the new Manitowoc model 3400 —a 65-ton capacity crane convertible to dragline, shovel, trench hoe and clamshell. Without hook rollers, overhead clearance heights are reduced up to 9 inches. The machine can travel and work in places previously inaccessible to a crane of this size and capacity. In addition, the gantry can be quickly lowered without removing the boom, bringing the overhead clearance height down even farther.

The alloy steel main drum shaft holds both drums, which are cast steel with removable alloy iron flanges and oversize bearings. Various sizes of grooved steel laggings are interchangeable, providing a wide range of line pulls and speeds. Swing-travel and shovel retract clutches on the main drive shaft of the model 3400 are disc-type. They are easily adjusted or replaced.

Other features include torque converter drive; independent double drum boom hoist; box-design crawler frames; one-piece cast carbody; and a new easy method for jack adjustment of crawler tension.

Optional features include a third drum for pile driving; independent swing for steel setting or tight maneuvering; and removable counterweight for between-job shipment by rail or truck. This removable counterweight is handled completely by the model 3400 without jacks, blocking or other machines standing by.

Dump Wagon

Manufacturer: Allis-Chalmers Mfg. Co., Department EE, Milwaukee 1, Wis.

Claims: Allis-Chalmers has added a new all hydraulic TR-160 rear-dump motor wagon to its construction machinery line. The new unit has a carrying capacity of 12 tons—7.7 cubic yards struck and 12 yards heaped.

Power unit is a 6-cylinder Allis-Chalmers supercharged diesel engine rated 155 hp at 2,200 rpm. Shipping weight of the TR-160 is 28,100 pounds. A five-speed constant-mesh transmission provides forward speeds from 3 to 25.4 mph, and reverse at 3 mph.

The TR-160 is equipped with A-C's Kon-Tork differential which automatically controls the amount of torque delivered to each drive wheel in relation to traction requirements.

The 7-ft. 11-in. wide unit is highly maneuverable and can make a non-stop 180° turn in 22 feet 8 inches

Continued on page 59

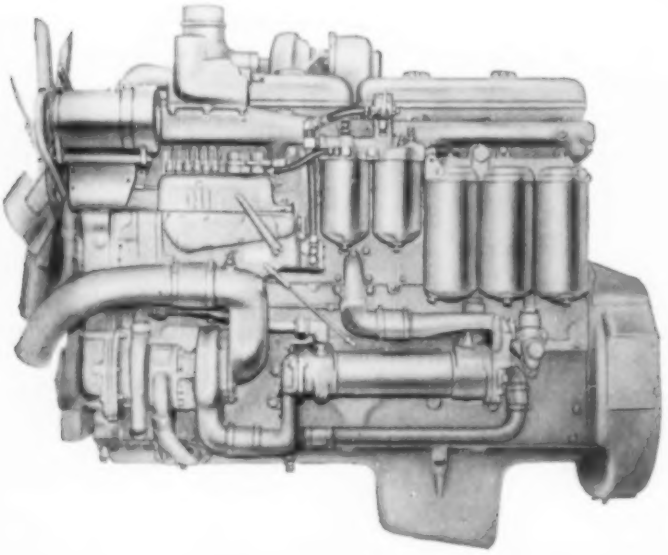
How BRAWN-BACKED Payscraper® features give you stepped up...loading

From power plant to push-block, the 34-cu. yd. International 295 Payscraper gives you an exclusive combination of features that step up dirt-on-fill delivery! Compare quiet, big-capacity DT-817 Payscraper power. Try the advantage of up or down, on-the-go, Payscraper power-shifting that provides load-speeding *automatic* direct-drive lock-ups in second, third, and fourth gears! Measure *extra value features* like safe, effortless power-steering—that leaves "the steering feel in the steering wheel." Note how exclusive torque-cushioning planetary drive axles add dependability to rough-and-tumble earthmoving! See how 122-inch bowl width speeds loading and unloading—adds control ease and stability, loaded or empty. Prove on your job that bonus performance "rides" the Payscraper bowl. Choose the 2-axle "295"; or 3-axle, 34-cu. yd. "495." See your International Construction Equipment Distributor for a demonstration.

...roading

Payscraper power-to-payload punch tops all other rubber-tired rigs—because the fast-slugging, high-torque International DT-817 diesel is the Payscraper power plant! The 375-hp, turbocharged DT-817 gives you direct, push-button starting; all-altitude high-efficiency performance; power for top rim-pull to help speed all steps of the cycle; time-saving "no-lag" control power!

...dirt-on-fill capacity!



Even "dead" sand comes alive and "boils" fast into the Payscraper bowl. Every detail of Payscraper design aims at speeding the cycle, and *staying available!* The 21-inch diameter steel cross tube provides super load-bearing strength and resistance to impact. Bowl "backbone," draft arms and side reinforcing members all are massive high-strength box-section steel weldments. "X"-member reinforcing maintains perfect push-frame alignment at all times. And the 4-speed, planetary-type, torque-converter power-shift transmission automatically adjusts torque and load to speed — to maintain full capacity!

You steer the 140,000-lb. loaded Payscraper almost as easily as a 3,600-lb. automobile! Payscraper gives the big control advantages of (1) exclusive International rack-and-pinion plus tandem pump steering system; and (2) 3-degree forward spindle pitch that improves scraper balance and prevents "nose downs" in high-speed turns. The 16-adjustment, bump-smothering seat builds operator confidence, too. And reach-easy power brakes, "control tower" vision, and flush deck safety help him deliver full Payscraper capacity, and take advantage of speeds up to 33.5 mph. He commands ample power and traction to pull *directly* out of 90-degree turns, even on soft fills!

The fast, positive-acting Payscraper ejector mechanism is powered by the International PTO-driven Cable Control Unit. One cable drum of this simple planetary system actuates the apron and ejector; the other drum positions the bowl to control spreading action. Apron lifts to a big 94-inch opening. Two ejector-plate pushing members apply dozer-like action to force out the whole 34-cu. yd. load cleanly. Action of six heavy-duty springs, stretched during ejection, positively powers the ejection mechanism's return!

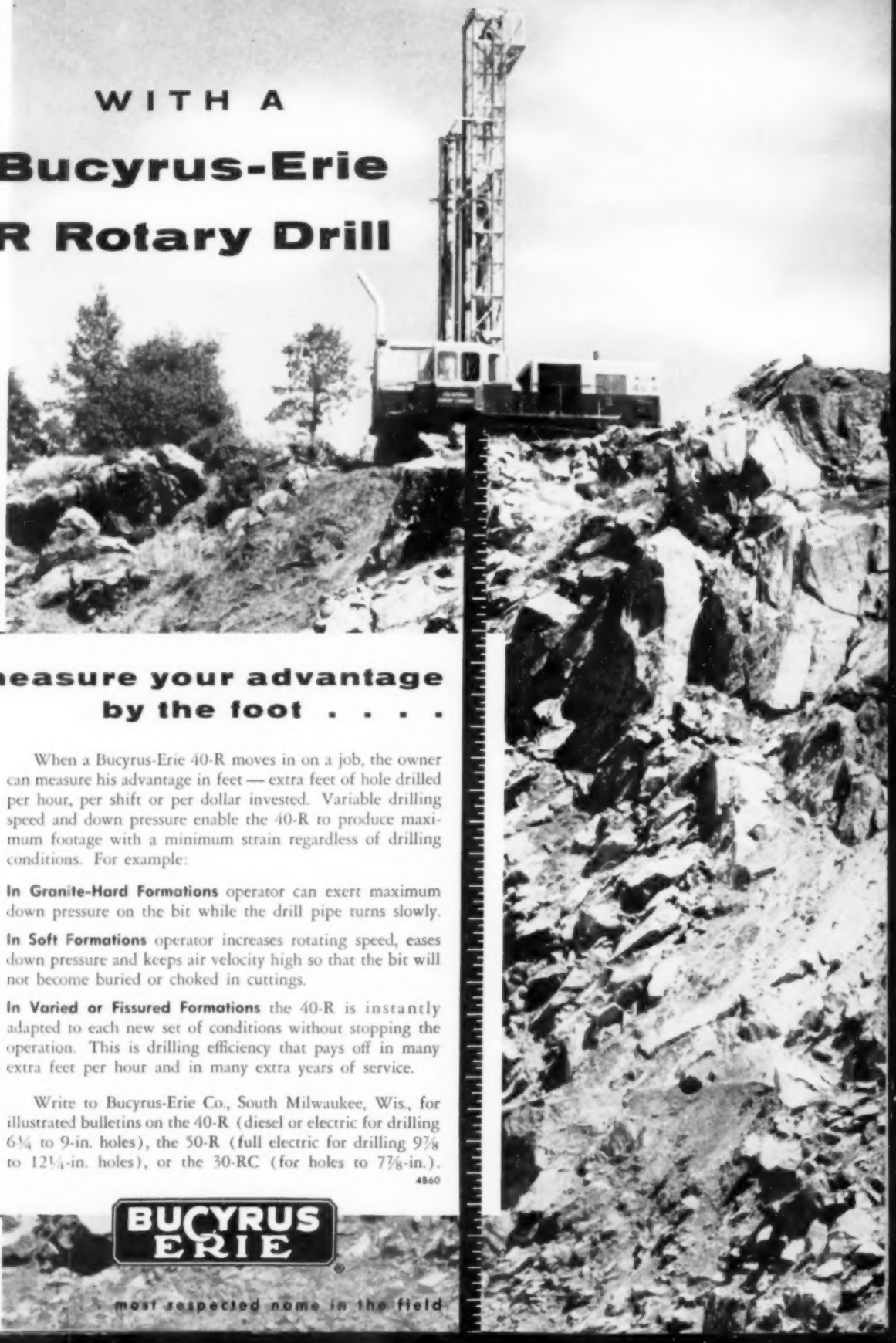
Here's your 76-page cost and production estimating book— newest, most authentic and complete guide for estimating material-moving costs—and for selecting equipment combinations for top profits, anywhere! Yours for the asking from your International Construction Equipment Distributor!

International Harvester Co., 180 N. Michigan Ave. Chicago 1, Illinois
A Complete Power Package

International® Construction Equipment

WITH A

Bucyrus-Erie 40-R Rotary Drill



You measure your advantage by the foot . . . .

When a Bucyrus-Erie 40-R moves in on a job, the owner can measure his advantage in feet — extra feet of hole drilled per hour, per shift or per dollar invested. Variable drilling speed and down pressure enable the 40-R to produce maximum footage with a minimum strain regardless of drilling conditions. For example:

In Granite-Hard Formations operator can exert maximum down pressure on the bit while the drill pipe turns slowly.

In Soft Formations operator increases rotating speed, eases down pressure and keeps air velocity high so that the bit will not become buried or choked in cuttings.

In Varied or Fissured Formations the 40-R is instantly adapted to each new set of conditions without stopping the operation. This is drilling efficiency that pays off in many extra feet per hour and in many extra years of service.

Write to Bucyrus-Erie Co., South Milwaukee, Wis., for illustrated bulletins on the 40-R (diesel or electric for drilling 6¾ to 9-in. holes), the 50-R (full electric for drilling 9⅞ to 12¼-in. holes), or the 30-RC (for holes to 7⅞-in.).

4860

BUCYRUS ERIE

most respected name in the field

New Equipment . . .

Continued from page 55

with a ⅛ turn of the steering wheel. A lesser turn of the steering wheel regulates hydraulic power to the double-acting steering jacks for smooth control at fast haul speeds.

The TR-160 is mounted on four 18.00 x 25 tubeless rock tread tires. When empty, two-thirds of the weight

is carried on the tractor tires; when loaded, 49% of weight is carried on the tractor wheels and 51% on the wagon wheels. Four-wheel air brakes are standard.

A heavy-duty all-steel cab, offered as optional equipment, adds further to the comfort and protection of the operator without sacrificing visibility.

The wagon body has a loading area of 11 feet by 7 feet 10 inches, and provides a big target for shovel and dragline loading. Its average 7-ft. loading height lends itself to smaller crawler and rubber-tired tractor shovel loading.

To permit greater use-value, the rear dump wagon is quickly interchangeable with the 7-yd. S-160 scraper.

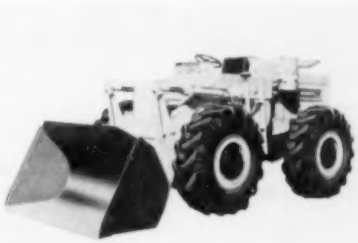
Payloader Improvements

Manufacturer: Frank G. Hough Co., Department EE, 708 Seventh Ave., Libertyville, Ill.

Claims: Series B models of the H-70 and H-90 Payloader tractor-shovels offer numerous improvements which increase production of these four-wheel-drive units.

While operating capacity of the H-90 series B unit remains at 9,000 pounds, the peak lift has been increased to 18,000 pounds. This model now has a longer wheelbase and wider tread which, along with greater machine weight, provides better balance and greater stability for operation under adverse conditions.

Additional power is provided by a new Cummins turbo-charged diesel engine which develops 162 hp at 2,100 rpm. A GMC diesel, which develops 153 hp at 2,200 rpm, is offered as an option.



The H-70 series B Payloader retains the same recommended operating capacity of 7,000 pounds, but the peak lift has been increased to 13,000 pounds. Improvements in the boom arm design and bucket control linkage provide additional digging power, especially helpful for below grade excavation.

More power is provided by a larger Cummins diesel engine which develops 124 hp. Optional power for this series B unit include an IHC gas engine and a GMC diesel.

"We know the value of a completely engineered ELLICOTT DREDGE"

Says Mr. Leonard Mulbry of the New Smyrna Dredging Company, operating in the Waterway Community "VENEZIA," at New Smyrna Beach, Florida. "This is our third year of operation with the dredge 'Bold Venture' obtained from Ellicott in 1957," continues Mr. Mulbry. "By now we have been able to determine the value of obtaining a completely engineered dredging unit from a reputable company, rather than building one ourselves, or obtaining one from a less well established firm."

"We are more than satisfied with the production and operation of our Ellicott 'DRAGON®' Dredge. It is not only well engineered and accurately constructed, but easy and economical to operate. Our records show that *this purchase was the wisest decision we ever made.* Per dollar invested in the dredge and its operation, we are able to get about twice the land area pumped up as by other means. We estimate the *savings will be close to $500,000* by the time the project is completed."

You can enjoy similar savings with an Ellicott "DRAGON®" Model Dredge, designed and manufactured by a company now marking its 75th year in designing and building dredges and dredging equipment. Write for information to Ellicott Machine Corporation, 1619 Bush Street, Baltimore 30, Md.

2378

Celebrating Our 75th Year

ELLICOTT DREDGES

ELLICOTT

ELLICOTT MACHINE CORPORATION, Baltimore 30, Maryland, U.S.A.; Timberland-Ellicott, Limited, Woodstock, Ontario, Canada; Dragues Ellicott France, Paris, France; Dragas Ellicott do Brasil Ltda., Rio de Janeiro, Brazil; Ellicott de Mexico, Mexico City, Mexico; Ellicott Fabricators, Inc., Baltimore, Maryland; McConway & Torley Corporation, Pittsburgh, Pennsylvania.

Successors to the floating dredge business of the Bucyrus-Erie Co. and the American Steel Dredge Co. Complete engineering, design and construction services.

WHICH IS BEST
3 new series Cat Motor Graders

NEW	NEW	NEW
No. 12	TURBOCHARGED No. 112	No. 112
Series E	Series F	Series E
115 HP	100 HP	85 HP

for higher production, easier servicing and long life!

No machine is better than its engine—and the new Cat Diesel Engines in these three new series Motor Graders are better than ever. They're more compact, more rugged and modern in design. They incorporate the latest developments in metallurgy and technology. They provide three important bonuses—greater lugging ability in tough going, easier servicing and long life.

A COMPLETE LINE—85 HP to 150 HP

The new Turbocharged 100 HP No. 112F is designed for high production to match work requirements between the new 85 HP No. 112E and new 115 HP No. 12E. Compared with the 85 HP model, the 100 HP machine delivers 5% higher travel speeds and a 5% increase in blade speed control. With its introduction into the line, Caterpillar now offers you a choice of four Motor Graders in all to meet your specific requirements. The largest is the Turbocharged 150 HP No. 14, the most versatile big grader ever developed.

SEE YOUR CATERPILLAR DEALER

Some of the features of the new Cat Motor Graders are described briefly here. But for the complete picture, see your Caterpillar Dealer. Ask him to show you how they're a better buy for your money than ever. Take a look under the hoods at the new modern-design engines. Better still, ask for a demonstration.

See how they "pull through" tough going.

Caterpillar Tractor Co., General Offices, Peoria, Ill.

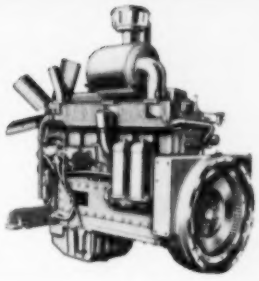
CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

MODERN HEAVY-DUTY MOTOR GRADERS TO FIT ANY JOB

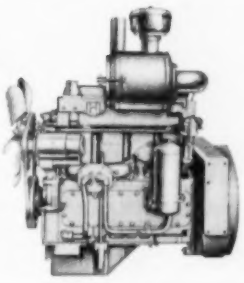
FOR YOUR JOB?
with new compact engines!

New No. 12E Motor Grader features new compact 115 HP Engine



New No. 112E Motor Grader features new compact 85 HP Engine

The new No. 112F is similar in appearance, but features a Turbocharged 100 HP Engine.

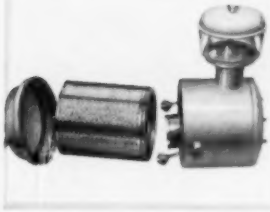


NEW HIGH TORQUE. Though the engines in the new Cat Motor Graders are designed specifically for each machine, they all develop higher torque than previous models and have other basic improvements in common. For example: shorter, stiffer blocks and crankshafts... stronger, distortion-resistant cylinder heads... improved cooling systems with greater capacity... engine lubricating oil conditioning... and advanced design fuel systems —new, compact fuel injection pumps with barrel and plunger assemblies in easy-to-service pump housings.

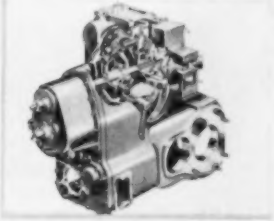
NEW STARTING ENGINE. Now standard is a new two-cylinder, vertical starting engine to replace the horizontal engine. All three Motor Graders use a modern 12-volt electric system. An optional 24-volt system is available for use in moderate climates where direct electric starting is practical.

PERFORMANCE-PROVED FEATURES. While many advances have been designed into the compact new engines, certain time-tested features have been retained. To mention a few: precombustion chamber design that delivers maximum horsepower on heavy, economy-type fuels... steel-back aluminum bearings... wet-type "Hi-Electro" hardened cylinder liners... and aluminum pistons with cast-in ring band.

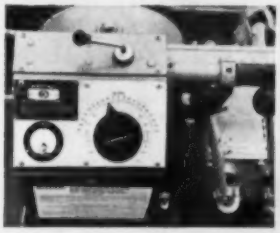
OTHER HIGH-PRODUCTION FEATURES IN CAT MOTOR GRADERS



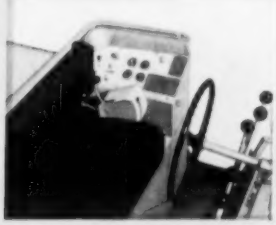
NEW DRY-TYPE AIR CLEANER (standard) removes a minimum of 99.8% of all dirt from intake air during every service hour. Can be serviced in 5 minutes. Cuts your maintenance time by as much as 70% and substantially reduces maintenance costs. Cleaner air also extends engine life.



EXCLUSIVE OIL CLUTCH (standard) provides up to 2000 hours service without adjustment, the equivalent of about 12 months of "adjustment-free" operation. A Caterpillar development proved by millions of hours of use, it virtually eliminates down time for clutch repair.



AUTOMATIC BLADE CONTROL (optional) cuts grading time in half. Operator sets desired slope on dial and only has to control depth of cut. Manufactured by Preco Incorporated, the unit automatically maintains blade slope within ⅛" in 10'. Available factory installed.



IN-SEAT STARTING (standard) offers operator finger-tip convenience and positive starts in any weather. Another feature: improved mechanical blade controls provide precise adjustment and ease of engagement. "Anti-creep" lock makes blade stay put under load.

NOT in the Contract

A German and a Russian were fishing on opposite sides of the river that divided the Russian and American zones. The German caught fish after fish, while the Russian didn't get a bite. Finally, the Russian yelled across the river: "How is it you catch fish and I get none?"

German (thinking a minute before replying): "I guess on your side they're afraid to open their mouths."

Penciled on the wall of a run-down restaurant: "Duncan Hines wept here."

Customer: "Have you a book called *Man, the Master of Woman?*"

Salesgirl: "The fiction department is on the aisle."

A slightly hilarious guest at a party embraced a strange woman by mistake. He apologized: "Excuse me, I thought you were my wife."

"You're a fine sort of husband for any woman, you stupid drunk," said the woman, angrily. "There, you see?" exclaimed the tipsy one, triumphantly. "You even talk like her!"

Texan: "Good mornin'. It's a big, bright, wonderful day, ain't it?"

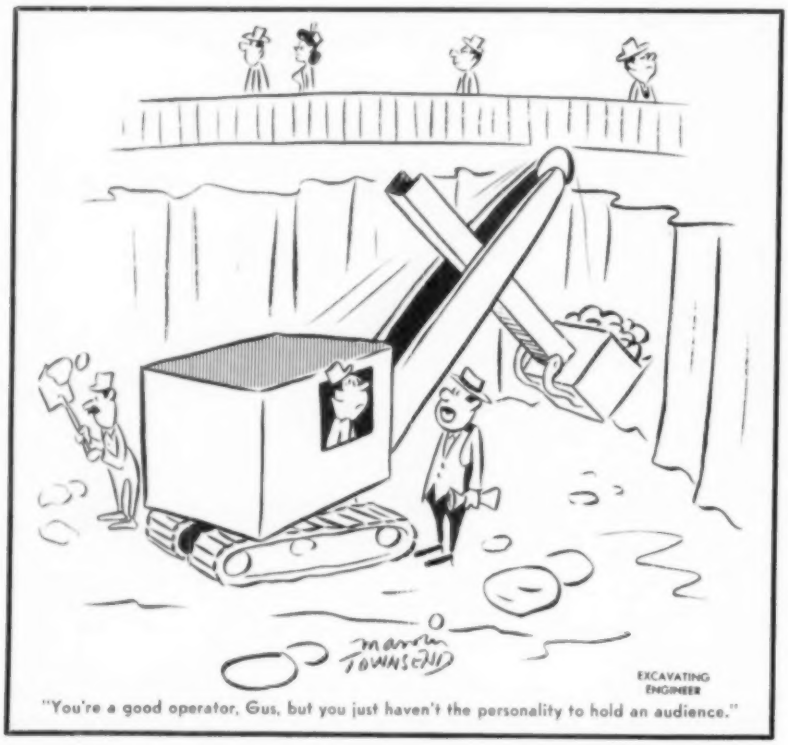
Automobile dealer: "Yes, sir. Can I help you?"

Texan: "I hope so. My wife's coming down with the sniffles and I'm looking for some sort of get-well car."

A postal clerk thought he was doing the young man a favor when he sold him 200 special-issue four-cent stamps in a new conservation series showing whooping cranes with their young.

The customer returned a short time later, however, pushed the stamps through the window, and asked for the regular kind.

"It won't do," he said. "We're sending out wedding invitations, and my girl says the cranes look too much like storks."



"You're a good operator, Gus, but you just haven't the personality to hold an audience."

At a dog show in Los Angeles, a spectator asked an attendant to direct him to the Labradors. "All the way down the aisle," said the attendant, "and the first door to the right."

The will of the wealthy, eccentric man was being read and the relatives all listened expectantly. Finally, the lawyer said: "And to my nephew, Charlie Jones, whom I promised to remember—'Hi, there, Charlie'!"

Brand-new ensign: "Listen, sailor, if the captain ever caught you calling this deck a floor, he'd throw you right out of one of those little round windows."

A long, sleek $10,000 limousine was gliding over a country road when it overtook a small car bouncing merrily along. The owner of the big car slowed up as he passed the other car and leaned out to mock its driver.

Owner of big car: "Goodness, friend, what makes that terrible rattling noise in your car?"

Owner of small car: "Oh, that's just my $9,500 change jingling around in my pocket."

Psychiatrist: "Do you have any trouble making up your mind?"

Luke: "Well—yes and no."

The home-owner was delighted with the way the painter had decorated his house.

Home-owner: "You did a fine job and I'm going to give you a little something extra. Here's $10. Take the missus to a show.

That night the bell rang and the painter stood at the door, all dressed up.

Home-owner: "What is it, did you forget something?"

Painter: "No, I just came to take the missus to a show."

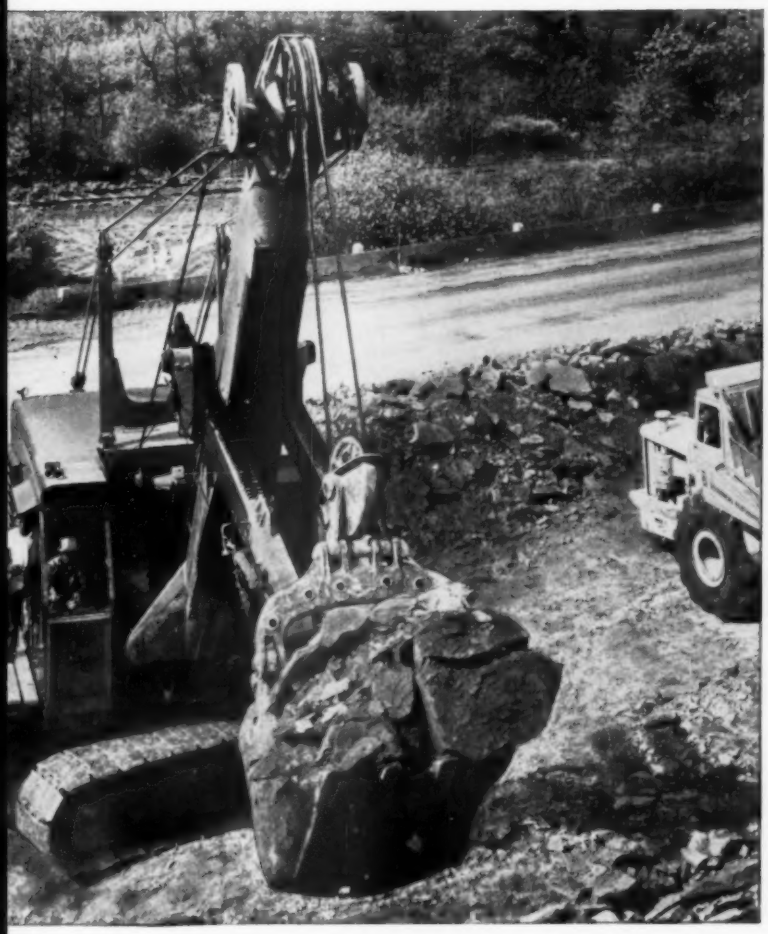
Sales manager: "What's this huge item on your expense account?"

Shovel salesman: "Oh, that's my hotel bill."

Sales manager: "Damn it all, don't buy any more hotels!"

330,000 yards of rock removed

by this shovel rigged with USS Tiger Brand Wire Rope



In 15 ten-hour working days this 2½ yard shovel scooped out 30,000 cubic yards of hard sandstone, shale and clay on the rebuilding of Route 39 near Salineville, Ohio. It had just finished another job where it had excavated 300,000 yards of rock . . . with no appreciable downtime.

USS Tiger Brand Wire Rope provides the tough, strong muscles that keep equipment working at top efficiency. These hoist lines must take the shock of digging rock. They must resist abrasive sandstone dust and severe vibration. In spite of these rough conditions, Tiger Brand Rope gives long service life with low cost.

No matter what kind of equipment you operate—shovels, scrapers, dozers, draglines, there's a USS Tiger Brand Wire Rope designed for the job.

Why Tiger Brand Rope is your best buy

It's designed by the country's leading wire rope engineers. It's made by *one* company that maintains the most complete research and manufacturing facilities in the steel industry. When you buy Tiger Brand, you get the right rope for the job . . . and you can get it quickly from leading distributors in your area. And your installation is no farther than a phone call away from experienced American Steel & Wire field service representatives.

For more information write American Steel & Wire, Dept. 0219, 614 Superior Avenue, N.W., Cleveland 13, Ohio.

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United States Steel

USS

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, Distributors Abroad

MANHATTAN HOTEL—To prepare the foundation for the new 2,000-room Zeckendorf Hotel in midtown Manhattan—the city's first new hotel in 29 years—Civetta Excavating, Inc., depends on Gyro-Flo compressors for needed air power. Shown here, just across the street from the famous Radio City Music Hall, two 600-cfm Gyro-Flos provide 100-psi air for I-R Crawl-IR's and wagon drills.

ILLINOIS QUARRY—At the Southern Illinois Stone Company's limestone quarry in Bucombe, Ill., this 600-cfm Gyro-Flo provides dependable drilling and motive power for the Crawl-IR drill that puts down a 10-foot hole in 10 minutes. In softer rock, 30-foot holes are drilled in 20 minutes.

JUGTOWN MOUNTAIN—Seven Gyro-Flo compressors—six 600-cfm and one 900-cfm—provide air power for one of the largest highway road cuts east of the Mississippi, at Jugtown Mountain near Phillipsburg, N. J. With this equipment, the Yonkers Contracting Company operates nine of Ingersoll-Rand's Crawl-IR drills—a power-packed combination that has helped keep production up and costs down.

GEORGE WASHINGTON BRIDGE—The new 12-lane lower level being added to the famed George Washington Bridge across the Hudson, requires a new system of approaches, mostly through solid rock. These three 600-cfm Gyro-Flo portables supply the air that powers the Crawl-IR drills for this 148,000 yard rock removal job.

PENNSYLVANIA HIGH SCHOOL—To break ground for the big new Easton Area Joint High School, the J. H. Beers Company powers this Crawl-IR drill with a husky 600-cfm Gyro-Flo compressor. Smooth, dependable compression with close regulation at all loads assures maximum drilling speed at lowest possible cost.

GYRO-FLO

in the News

Wherever rock is drilled—on large projects or small—cost-conscious contractors are supplying dependable, trouble-free air power with Gyro-Flo compressors. Ever since Ingersoll-Rand introduced the portable *rotary* compressor in 1950, the Gyro-Flo has set the highest standards of performance and economy. Simplicity of operation, freedom from maintenance, small size and light weight, air temperatures under 200F—low oil consumption and close regulation at all loads make Gyro-Flo the ideal running mate for *any* air-powered equipment.

Ingersoll-Rand Gyro-Flo portables are available in two- and 4-wheel models, in sizes from 85 to 900 cfm. Ask your Ingersoll-Rand representative how Gyro-Flo can help you cut the cost of compressed air on your next construction project.

Ingersoll-Rand

109A2 11 Broadway, New York 4, N.Y.

THE UNBEATABLE COMBINATION...GYRO-FLO COMPRESSORS AND I-R ROCK DRILLS

TO ADVERTISE: All advertising in this section is payable in advance. Rate $1.00 per line, or $12.00 per inch of 12 lines. Minimum charge $4.00. No discounts; no commissions. Please count your copy carefully to avoid delay. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Be sure to enclose the correct amount of money with your order. Closing date—10th of preceding month. Example: January closes December 10th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

LARGE SHOVELS, CRANES, DRAGLINES — 3 YDS. & UP

HEAVY EXCAVATION EQUIPMENT
DRAGLINES, SHOVELS, CRANES,
DRILLS, TRUCKS

15-W B-E elec. drag, 215', 12-yd.
450-W B-E diesel drag, 165' w/extra 10, 12, 13 & 14-yd. buckets.
9-W B-E elec. drag, 165', 10-yd.
9-W B-E diesel drag, 165', 12-yd.
7-W B-E diesel drag, 140', 7-yd.
7400 Marion diesel drag, 175', 13-yd.
7400 Marion elec. drag, 175', 12-yd.
625 Page diesel drag, 160', 9-yd.
621-S Page diesel drag, 125', 7-yd.
71-B B-E Crane w/160' boom.
200-W B-E diesel drag, 125', 6-yd.
2400 Lima elec. drag, 130', 6-yd.
2400 Lima diesel drag, 130', 6-yd.
4500 Manitowoc drag, 120', 5-yd.
120-B B-E elec. drag, 115', 5-yd.
3900, 3500 & 3000 Manitowoc cranes.
111-M Marion drag, 100', 4-yd.
1601 Lima 4-yd. shovel/drag.
1055 P&H drag, 80', 3½-yd.
1201 Lima dragline, 85', 3-yd.
54-B B-E drag, 80', 2½-yd.
5560 Marion 26-yd. elec. shovel.
151-M Marion 7-yd. elec. shovel.
1600 P&H 6-yd. elec. shovels.
170-B B-E 6½-yd. elec. shovel.
4161 Marion 6-yd. elec. shovel.
2400 Lima 6 yd. Std. & H&L shovels.
120-B B-E 4-yd. elec. shovel.
111-M Marion 4-yd. standard shovel.
1201 Lima & 54-B B-E standard shovels.
#6 Northwest 1½-yd. standard shovel.
Model T-650 Reich drill truck mtd. rotary and down-the-hole.
Ingersoll-Rand truck mtd. & crawler mtd. Drillmasters.
Euclid trucks, dozers, attachments, etc.

FRANK SWABB EQUIPMENT CO., INC
313 Hazleton Nat'l Bank Bldg.
Hazleton, Pa.
GLadstone 5-3658

EUCLIDS
Rear, Bottom and Scrapers

12-yd. Bucyrus-Erie dragline.
9-yd. Bucyrus-Erie dragline.
6½-yd. Bucyrus-Erie shovel.
4-yd. Bucyrus-Erie shovel.
4-yd. Bucyrus-Erie dragline.
3-yd. Bucyrus-Erie shovel.
2½-yd. Bucyrus-Erie shovel and dragline.
1½-yd. Bucyrus-Erie shovel.
5-yd. Manitowoc dragline.
6-yd. Lima dragline and shovels.
Large stripping shovels.
Other equipment available, not listed above.

WILLIAM LUBRECHT, III
Construction Equipment
311 W. Diamond Ave. Hazleton, Pa.
Phone: GLadstone 5-4041 or 5-0253

LARGE SHOVELS, CRANES, DRAGLINES — 3 YDS. & UP

P & H model 1300 electric shovel with longer than standard frontend, 3-yd. rock dipper, 34-ft. boom, 21-ft. handle, 36-in. crawler treads, serial #6294. One owner. $7,500 worth of both mechanical and electrical spare parts. Location, San Antonio, Tex. Price: $32,500 cash as is, where is. Will finance.

EXCAVATING ENGINEER
Box 3754 South Milwaukee, Wis.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

Model 2460 Warner & Swasey Gradall excavator. Delivered new in 1957, equipped with GMC diesel engine, 24" and 36" buckets and ripper tooth. In good operating condition. Priced to sell.

J. P. WAITE CONSTRUCTION CO.
3304 W. Pierce St. Milwaukee, Wis.
EV 4-1900

EXCAVATORS

1—Byers model 83-CC crane, 20-ton rating, mounted on Hendrickson crane carrier model 500E. Crane is equipped with 80' boom. Located at Phoenix.
1—Bucyrus-Erie 22-B equipped as a dragline 35' boom, Cat 318 power. A machine that has been serviced properly.
1—Bucyrus-Erie 10-BTC equipped as hoe and dragline, powered by gas engine. A clean machine.
1—Lima 604 shovel, powered by Cummins HIS diesel engine. There is a lot of production left in this machine and it is priced for a quick sale. Located at Casper.
1—Link-Belt LS71 equipped as a dragline powered by Int. UD14A engine, 45' boom with pendant suspension. A very clean machine.

ASPHALT EQUIPMENT

1—848 Barber Greene asphalt plant, equipped with feeder, bucket elevators, rotary drier, gradation unit, dust collector, pug mill, Cleaver Brooks steam boiler, G. M. model 4-71 engine, Caterpillar model D13,000 engines, also electric motors, wiring cables and panels that make this plant complete. We welcome inspections of this plant.

TRUCKS, SCRAPERS AND BOTTOM DUMPS

6—WD60 Koehring Dumptors S/N D-3651, D-3867, D-4202, D-4550, D-4551, D-4009, powered by General Motors diesel engines. These machines rate a very clean classification.
3—LeTourneau Super C Tournapulls, tires range from fair to good. These machines are all capable of operating. Located at Casper.
2—Caterpillar DW20 scrapers. You will want to check the price and condition of these machines if you are in the market for scrapers.

TRACTOR

1—Allis-Chalmers HD-21 equipped with front and rear push blocks, 24" pads, Twin Disc torque converter. We have repaired undercarriage, engine was rebuilt by previous owner and used approximately 1,000 hours.

MISCELLANEOUS EQUIPMENT

1—Model 200 Parsons trencher, powered by UD9 Int. engine, 21" wide buckets, crumber and cab.
1—Woods Roadmixer model 54 powered by Chrysler industrial engine P.T.O. for D8.
1—Buda generator model P.C.D.—1879 BM-D 3091-C Novo gas starting engine connected to Westinghouse generator AC 440 volt, 390 amps, 3 phase, 60 cycle Westinghouse exciter. This unit is ready to go to work.

THE COLORADO BUILDERS, SUPPLY CO.
1534 Blake Street Denver 2, Colo.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

Following attachments were removed from model H-3 Hydrocrane stock: H-EQ-1 Hoe equip. w. 18" bucket, 20" utilities dipper with side-cutters, ¾-yd. clamshell bucket, tagline reel, 3¼" heavy-duty digging ram. Net cash price complete—$2,000.

SYRACUSE SUPPLY CO.
294 Ainsley Drive
Syracuse 5, N. Y.

1—H-EQ-1 Hoe equipment for H-3 Hydrocrane. Almost new condition. Price: $1,250—F.O.B. St. Louis, Mo.

EUCLID SALES & SERVICE INC.
5231 Manchester Ave.
St. Louis 10, Mo.

H-2 magnet crane, serial #81118 mounted on International L-152, serial #76461, equipped with 24" magnet and SKW generator. Machine as is, in operating condition, price complete $5,000.

MOTT-MANBECK MACHINERY CO., INC.
Latham, N. Y.

Unit 45 tagline reel complete with fittings, hose and guard for H-3 Hydrocrane, good condition. Price: F.O.B. Minneapolis, Minn. $150.

THE ZECO CO.
2929 University Ave., S. E.
Minneapolis 14, Minn.

Bucyrus-Erie model 15-B hoe, serial No. 33634 with Hercules gasoline engine. New PM ¾-yd. dipper. Good working condition ..$3,500
Lorain model L50K, serial No. 25544, Caterpillar D318 diesel engine, combination dragline, clamshell, shovel, 75' crane boom, extended crawlers. Good condition throughout ..$15,000
Northwest model 25, serial No. 16381 hoe, ¾-yd. Amsco bucket. Caterpillar D318 diesel engine. Reconditioned and ready to work $16,750
Unit model 617, year 1954, serial No. 54125 cambered boom hoe, ⅝-yd. bucket, G.M.C. diesel engine with torque converter, extended crawlers with 22" treads. Good operating condition. $7,800
Bay City model 45, ¾-yd. hoe, serial No. 5993, Caterpillar diesel engine, standard crawlers. Good condition throughout $13,750
Shovel front also available.
Lima model 802, year 1949, serial No. 5145. Caterpillar 17000 diesel engine, Kohler light plant, combination dragline and clamshell, 60' boom, extended crawlers, 36" treads. Recently completely rebuilt $39,750
Lima model 1201, year 1954, serial No. 329514. Cummins L1 diesel engine, Kohler light plant, combination dragline and clamshell, 80' boom high gantry, extended crawlers, 40" treads. Good condition $63,500
Marion model 93-M, year 1948, serial No. 85G104 2½-yd. shovel, Caterpillar D17000 diesel engine. Machine in working condition. "As is." Machine location—Buffalo, N. Y. Price ..$7,500
Bucyrus-Erie model 54-B 2½-yd. shovel, serial No. 22854, Buda diesel engine, standard crawlers. Machine currently working. Location northern New Jersey $15,000
Bucyrus-Erie Hydrohoe attachment for H-3 Hydrocrane complete with 18" general purpose dipper, 20" utility dipper, 12" narrow dipper and all necessary fittings. Excellent condition. Complete $750
Lorain ¾-yd. shovel front, Amsco bucket complete with dipper trip. Excellent condition throughout $1,500
Bay City 45 ¾-yd. shovel front complete with dipper trip. Good condition $1,500

BINDER MACHINERY CO.
Brighton St. Union, N. J.
MUrdock 8-0060

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

HOES, CRANES & DRAGLINES

1—Michigan C-16—½-yd. hoe with 22" bucket, 9'9" crawlers, 20" wide, Hercules gas engine IXD #1742230, machine #3797, 4 years old.
1—Osgood 200—½-yd. hoe with 22" bucket, 11' crawlers, 22" wide, powered by Continental gas engine, machine #6285, 5 years old.
1—Lorain model TL-20 hoe with Waukesha gas engine, 6 years old, good condition.
1—Link-Belt model LS-80 crane with 50' boom, Rudomatic tagline, Buda gas engine, s/n 7074.
1—Link-Belt model LS-60 hoe, Buda gas engine, s/n 8128.
1—Bucyrus-Erie 10-B gasoline powered combination dragline and clamshell, 28' boom, bargain price.
1—Bucyrus-Erie 10-B gasoline powered dragline, standard cats, excellent shape, s/n 20429.
1—Bucyrus-Erie 15-B dragline with 20" treads, GMC 2-71 diesel engine, s/n 75239.

AIR COMPRESSORS

1—LeRoi 315 air compressor on 4 pneumatic tires, 7 or 8 years old.

MISCELLANEOUS

1—Bucyrus-Erie 15-B—½-yd. shovel attachment perfect.
1—Wiley PM215 Patchmovile portable asphalt patching unit on two pneumatic tires, complete with rotary dryer. This unit is new.
1—Ruhr M-1—½-yd. heavy-duty grapple, new, excellent buy.
1—Wayne 36" rider industrial vacuum pick-up sweeper, demonstrator, 2 years old.
2—CMC Jetcretes with all accessories. Excellent condition, practically new with all extra accessories.
1—Ross 6-ton pneumatic tired fork lift truck, 10' mast, 14' lift.
1—Used Kennedy-VanSaun revolving scrubber washer screen, 48" dia. x 21'0" long, in excellent shape and complete with all new parts including extra scrubber sections and new sizing screens.
1—Ford 1956—F-600 stake body truck, s/n F602N14988, air brakes, heavy-duty dump hoist, 2-speed rear and oversize motor.
1—Vermeer crawler trencher 12"—24" trench, Wisconsin 4-cylinder gas engine.

S. M. CHRISTHILF & SON, INC.
Timonium Rd. & Harrisburg Expressway
Timonium, Md.

Bucyrus-Erie 15-B hoe, serial #72905, Cat D315 diesel engine. Good shape. Loc. Cleveland, Ohio.
Manitowoc 3600 3-yd. shovel, serial #36016, Cummins diesel engine, excellent. One year old. Loc. Cleveland, Ohio.
Bucyrus-Erie 10-B 25-ft. crane boom, w/fairlead. Good shape, but not painted. Loc. Cleveland, Ohio. $750.
Link-Belt LS-85 ¾-yd. shovel Cat D318 diesel engine, excellent shape. Loc. Columbus, Ohio. $14,500.
Link-Belt LS-71 3.4-yd. hoe, Cat D315 diesel engine. Very good cond. Loc. Columbus. $14,500.
Unit 614 ½-yd. hoe, SN—53173, Chrys. gas engine w/TC overhauled. Loc. Columbus. $10,500.
Lorain TL-20 clamshell crane, SN 15297, Waukesha gas engine, includes ¾-yd. bucket. Loc. Cleveland. $10,500.
Pictures and/or complete description available on any item.

THE W. W. WILLIAMS CO.
835 Goodale Blvd. Columbus, Ohio
Phone: CApital 8-6651

TRUCK CRANES

Northwest No. 25 truck crane, S/N 12454, 70' boom telescoping boom stop, outriggers and floats, Dart carrier, 10 almost new Michelin 11:00 x 20 tires. Gas engine, good operating condition $13,000
Bucyrus-Erie H-3 (5-ton) self-powered hydrocrane, 18 by 26' telescoping boom, powered by a Ford engine, tagline and clamshell bucket. Mounted on a Ford F600 truck, hydraulic outriggers. Reconditioned. $9,000
Lima 34 crane, independent boom hoist, power up and down, Cat engine, 50' boom. Rebuilt. $15,000

SHOVELS

Lorain 820, 2-yd. crane and clamshell, 65' boom, pendant suspension, 34" tracks, Rudomatic tagline, Cat D13000 diesel engine, S/N 18523. Rebuilt and guaranteed $33,000
Lima 802 2-yd. shovel S/N 32618, 36" pads, air controls Cat D17000 engine with electric starter. Rebuilt and guaranteed $30,000

H. O. PENN MACHINERY CO., INC.
140th St. and East River New York 54, N. Y.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

AT HOUSTON

1—Bucyrus-Erie 15-B dragline, S/N 59821, 35' boom, IHC UD-9, mounted on tractor type tracks.
1—Bucyrus-Erie 22-B (std.) hoe, S/N 119144, with Esco ¾ yd. bucket. IHC UD-525 rebuilt.
2—Bucyrus-Erie 22-B, 40-10 hoe, S/N 119174, IHC UD-525 diesel, with Esco bucket, Unit 76A tractor type mounting, Unit 19A swing brake.
1—Lorain 30, ½ yd. shovel, S/N 10198 gas engine, (located at Taylor, Texas).
1—Lorain TL-20 dragline, S/N 15456, 35' boom, Cat D-4400 diesel, 22" track shoes.
1—Lorain TL-25 ¾ yd. backhoe, S/N 23276, Cat D315, 22" shoes.
1—Northwest 25 dragline, S/N 19079, 35' boom, 28" track shoes, Cat D318.
1—Bucyrus-Erie 15-B hoe attachment (straight boom), reconditioned.
1—Bucyrus-Erie Unit 20-A hoe equipment with ¾ yd. Esco bucket for Bucyrus-Erie 22-B (cambered boom).
2—Bucyrus-Erie Unit 20-A hoe equipment with ¾ yd. Esco bucket, for Bucyrus-Erie 22-B (cambered boom).

AT DALLAS

1—Bucyrus-Erie 15-B 40-10 dragshovel w/Cat diesel engine, Unit 76 tractor type tracks, Unit 79-B, extra counterweight, and w/set street plates, S/N 118938, motor #D315, 9S-12683, reconditioned.
1—Bucyrus-Erie 15-B 40-10 dragshovel w/Cat D315 diesel engine, and with Unit LBb 35' dragline boom attachment w/fairlead, and Unit 3 clamshell equipment, and w/new 604-¾ Blaw-Knox ½ yd. clamshell bucket, machine #11893, motor #9S-123970, condition, like new.
2—Bucyrus-Erie 22-B dragline, 35' boom, Cat D318 engine, #92141, reconditioned.
2—Bucyrus-Erie 22-B comb. 60-10 clamshell excavator, 45' boom, Unit 79 extra counterweight, tractor type tracks, Cat D318 diesel engine, reconditioned. #119700.
1—Bucyrus-Erie 22-B comb. 60-10 clamshell excavator, w/45' boom, continuous suspension, 6-part tackle, Unit 79-B extra counterweight, Unit 76-A tractor type tracks, #119703, reconditioned.
1—P&H ½ yd. dragline, #59060, fair condition.
1—Lorain model 41 dragline, #14432, good condition.
1—Northwest model 25, ¾ yd. backhoe, GM diesel engine, machine #11313, reconditioned.
4—Northwest 25 backhoe, Cat diesel engine, reconditioned.
2—Northwest 25 dragline, 35' boom, Cat diesel engine, reconditioned.
1—Insley model K-12 backhoe, #55690, good condition.
1—Insley model K-12 dragline w/35' boom, U9 IHC gas engine, ⅝ yd. dragline bucket, #1801, reconditioned.
1—Schield-Bantam T-35 backhoe attachment, complete, excellent condition.
1—Link Belt LS-50 backhoe attachment complete, fair condition.
1—Link Belt LS-50 shovel attachment complete, fair condition.
1—Bucyrus-Erie 10-B shovel attachment, fair condition.
1—Marion 362 shovel attachment, 1½ yd., excellent condition.

AT LONGVIEW

1—Diamond plant, model 124 w/sand rejector, fuel tank, air brakes on rear wheels, dual rear wheel, 8:25 x 20, battery box, battery box cables, grooving flywheel for crusher, 5th wheel and truck, UD-14-A IHC power unit, engine drive pulley, and with screens top deck 1½" sq. opening, bottom deck ⅜" sq. opening.

AT LUBBOCK

1—22-B Bucyrus-Erie backhoe, Cat diesel engine, #73017, good condition.
1—Northwest 25 truck crane, 45' boom, Dart carrier, #20735, excellent condition.

BROWNING-FERRIS MACHINERY CO.

Dallas	
305 Exposition Ave.	**TA 3-8121**
Longview	
Highway 80	**PL 9-2761**
Lubbock	
2424 Clovis Rd.	**PO 5-7455**
Houston	
2619 Texas Ave.	**CA 5-3231**

Northwest model 6 combination crane, clamshell and dragline. Has 75' boom, 15' jib, Murphy diesel engine. Engine rebuilt one year ago. This is a 1950 machine in good condition, ready to go. Priced reasonably.
Bucyrus-Erie model 38-B combination crane and clamshell. Has 50' boom, Caterpillar D13000 diesel engine, 33" wide treads. Machine is in excellent condition.
Both machines are located in the Chicago area and are available for inspection.

D. D. KENNEDY, INC.
P. O. Box 177
Bellwood, Ill.
AUstin 7-4300 LInden 4-5690

Lima model 34 crawler-mounted clam-digging-hoe combination, Buda gas engine, 35' boom, dragline fairlead, tagline reel, hoe boom with dipper. Priced to sell. Will sell with one or both attachments.
American model 375 crawler-mounted dragline-clamshell combination, Series 3-71 G.M.C. diesel engine, long crawlers, fairlead, 35' boom, excellent condition.
Unit model 357 rubber-tired wagon crane, equipped with new Chrysler Industrial engine, 25' boom, tagline reel, overhauled machinery, repainted, excellent condition.
Lorain model 55 crawler-mounted shovel, equipped with UD-18 I.H.C. diesel engine, complete with 1-yd. shovel dipper. Machinery partially overhauled. Operating condition. Make us an offer for parts or as a standby machine.
Bay City model 45 crawler-mounted dragline-clamshell machine, equipped with Cat D4600 diesel engine, long crawlers, 45' boom, tagline reel, dragline fairlead. Hoe attachment available. Price as a hoe or dragline at our yard $7,500. No trades.
Gradall model 2460. New in 1957, equipped with G.M.C. Series 3031C diesel engine on upper works. Mounted on Duplex 6 x 4 truck carrier. Included are 24" and 36" digging buckets and frost ripper. Machine in good condition and priced to sell at $18,000 at our yard. No trades on this special.
Bucyrus-Erie model 22-B crawler-mounted hoe or crane. Powered with Cat D318 diesel engine, long cats, 30" crawler treads. Machine new in late 1955. Excellent condition.
Bucyrus-Erie 22-B Transit Crane, 25-ton, equipped with G.M.C. Series 3-71 diesel engine with torque converter and two-lever governor control. Pin-connected boom up to 110' available. Mounted on Crane Carrier. Outrigger screw jacks with floats. Power steering on carrier. Demonstrator machine being offered at a considerable reduction. Call or write for more details.
Bucyrus-Erie model 11-B demonstrator 10-ton Transit Crane, equipped with up to 70' of boom. Six wheel drive carrier. Hoe equipment also available. Like new condition.
Northwest model 80-D shovel. Good working condition. Call or write for more details.
Lorain model 80-J crawler-mounted crane. Write for more details.
Model 55 Lorain crawler mounted shovel, equipped with UD-18 IHC diesel engine, complete with 1-yd. shovel dipper, machinery partially overhauled and in operating condition. Our asking price is $2,500 but make us an offer.

Hydrocrane Trade-Ins

Model H-2 Bucyrus-Erie Hydrocrane mounted on a Chevrolet truck chassis, equipped with 2-piece boom, rear outriggers, reel and bucket available. Priced to sell at $2,500 at our yard.
Model H-3 Hydrocrane, 1950, mounted on I.H.C. truck chassis, 2-piece telescopic boom, tandem outriggers, operator's cab, tagline reel, hose, ⅜-yd. Hydrocrane clamshell bucket. Very good condition.
Model H-3 Hydrocrane, 1953, mounted on G.M.C. truck chassis, 2-piece telescopic boom, tandem outriggers, operator's cab, tagline reel, hose, ⅜-yd. Hydrocrane clamshell bucket. Recently overhauled. Very good condition.
Model H-3 self-powered Hydrocrane, 1955, mounted on G.M.C. 6 x 6 truck chassis, 2-piece telescopic boom, operator's cab, tandem outriggers, tagline reel with hose, ⅜-yd. clamshell bucket. Ford 4-cylinder Industrial engine on Hydrocrane upper. Excellent condition.
Model H-3 Hydrocrane, 1952, mounted on Ford truck chassis, equipped with 2-piece telescopic boom, operator's cab, tagline reel, ⅜-yd. clamshell bucket. Very good condition.
Model H-3 self-powered Hydrocrane, 1957, equipped with 2-piece telescopic boom, tandem outriggers, operator's cab with heater, reel and new style ⅜-yd. clamshell bucket, mounted on I.H.C. S-172 truck chassis. Complete machine in like new condition at a reduced price.
Model H-3 Bucyrus-Erie self-powered Hydrocrane equipped with 3 piece boom, ⅜-yd. clamshell bucket, tagline reel. Gar-Bro concrete bucket, mounted on model S-172 IHC truck chassis. Machine and truck were new in 1957. Used 450 hours. Save on a like new machine.

J. P. WAITE, INC.
3304 W. Pierce St. Milwaukee, Wis.
EV 4-1900

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

SHOVELS, CRANES & ATTACHMENTS

Bucyrus-Erie model 38-B, 1½-yd. dragline with long and wide track, 11'6" wide, 7'5" long, 35" pads, 70' boom, pendant suspension unit, 79 extra counter weights. Powered by IHC UD 1091 diesel engine. Total weight 109,360 lbs. Replacement cost $69,915. Like new condition, 4 mos. of rental service is all this dragline has been used $49,900
F.O.B. Louisville, Ky.

Bucyrus-Erie model 51-B, 2-yd. capacity lifting crane with 100' boom and 20' jib. Long and wide under carriage, 40-ton sheave block. Powered by Buda model 6HCB diesel engine. Crane less than 2-yrs. old has been in our rental fleet. Saw very little service, like new condition. Replacement cost approximately $82,000 $69,000 F.O.B. Louisville, Ky.

Bucyrus-Erie model 22-B heavy-duty dragline, clamshell, 60' boom pendant suspension, lifting crane, long and wide tracks, extra counter weights. Powered by IHC UD-525 diesel engine. Replacement cost $34,499.
F.O.B. Louisville, Ky. $24,500

Bucyrus-Erie model 22-B, ¾-yd. capacity basic machine, powered by IHC model UD-525 diesel engine. Less than 3-yrs. old. Excellent condition. From our rental fleet. F. O. B. Louisville, Ky. $19,100

Bucyrus-Erie model 22-B heavy-duty crane, dragline and clamshell 51-20 combination, 30" treads. Powered by Int. model UD-525 diesel engine. Long and wide tracks. Like new condition $24,500
F.O.B. Elizabethtown, Ky.

Bucyrus-Erie model 11-B hoe attachment will fit 10-B Bucyrus-Erie also. Serial No. 12930. .$800
F.O.B. Elizabethtown, Ky.

Lorain model 40, ¾-yd. shovel on crawlers. Powered by gasoline engine, serial No. 7912. .$4,500
F.O.B. Elizabethtown, Ky.

Lorain model L-80, 1¼-yd. shovel, crawler mounted. Powered by Cat model D-13000 diesel engine. Shovel in fair operating condition.
F.O.B. Elizabethtown, Ky. $12,500

P&H model 255 ¾-yd. dragline with Waukesha gas engine. Condition very good. Serial No. 10926 .....$4,873
F.O.B. Evansville, Ind.

P&H model 255 ¾-yd. shovel, crawler mounted. Powered by Cat model 315 diesel engine. Serial No. 5918 .....$14,500
F.O.B. Elizabethtown, Ky.

Koehring (2) model 304, ¾-yd. capacity shovel front attachments. Like new condition. Serial No. 398 .....$1,900 (ea.)
F.O.B. Elizabethtown, Ky.

Indey model ¾-yd. hoe attachment, serial No. 12951 .....$1,200
F.O.B. Elizabethtown, Ky.

Lorain model TL-20 dragline with 45' boom, Waukesha gas engine. Undercarriage rebuilt. Good operating condition. Serial No. 5920.
F.O.B. Evansville, Ind $8,500

Bucyrus-Erie model 10-B, ⅜ cu. yd. shovel, 1952 model, Buda gas engine. Excellent condition. Serial No. 12815 .....$6,000
F.O.B. Evansville, Ind.

Unit model 514, ½-yd. shovel with standard undercarriage. Powered by Chrysler model C-36 gas engine. Fair operating condition. $3,750
F.O.B. Paducah, Ky.

GRADALLS

Model 2460 mounted on 6 x 4 carrier. Powered by Cummins model J61P diesel engine. Complete remote controls. Like new—two mos. use. Replacement cost $34,520 (from our rental fleet) $31,800
F.O.B. Louisville, Ky.

Model 2460 with all standard equipment. Mounted on Gradall carrier, powered by IHC UD-370 diesel engine. Two months rental like new condition. Replacement cost $31,000 (from our rental fleet) $29,000
F.O.B. Louisville, Ky.

Model 2460 mounted on crawlers. Powered by Int. UD-370 diesel engine. Complete remote controls. Like new—two months use. (from our rental fleet). Replacement cost $29,295.
F.O.B. Evansville, Ind. $26,420

Model mounted on White 6 x 4 tandem truck. Gradall powered by Int. diesel engine. Available with three extra buckets. Serial No. 6911.
F.O.B. Louisville, Ky. $8,950

KOEHRING DUMPTORS

3 Model WD-60 Dumptors, 6 cu. yd. GM diesel engines. Good tires .....$12,000 Lot
Price F.O.B. Elizabethtown, Ky.

Write—Wire or Phone Jim Waddell

BRANDEIS MACHINERY & SUPPLY CO.
P. O. Box 1705 Louisville 1, Ky.
MElrose 7-4741

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

Bucyrus-Erie 38-B shovel 1½-yd. serial No. 101377 with Cat D13000. Very good condition $31,000

Bucyrus-Erie 38-B crane-clamshell-dragline combination, serial No. 45797 GMC 6-71 engine, 75' boom, long and wide crawlers. Very good. $22,500.

Bucyrus-Erie 22-B heavy-duty crane-clam-backhoe combination. GMC 3-71 diesel, serial No. 119906. Less than 400 hours, like new. Combination hoe and crane $30,000. Hoe or crane only, $27,500.

Lorain 41 shovel ¾-yd. Cat D4600 engine, serial No. 14597 .....$8,900

Unit 10-20 truck crane ¾-yd., serial No. 49049. GMC 3-71 diesel mounted on Dart carrier, 30' boom. Good condition. $11,950

Insley K-12 dragline, serial No. 11289 with Buda gas engine, 35' boom, good condition $9,900

Vibro-Plus CH-30 compactor. 3.5 tons, dynamic impact 7 tons. Waukesha diesel. Demonstrator, like new $8,000

Gelbhard model 120 double drum sheepsfoot 60" drums. Very good $5,300

Kiesler 1½-yd. rehandling clam with counterweight type H. Like new $1,900

Esco ¾-yd. orange peel model 379. Excellent $2,125

CONTRACTORS SUPPLY
620 East 18th St. Kansas City, Mo.
Phone: BA 1-7788

Dixie-Lorain 107 backhoe w/shov. front, clam, 45-ft. crane. Int. TD-9 angle dozer used 3 years. Perfect condition. Owner operated. Priced to sell.

PERRY LEGG AND SONS, INC.
Tannersville, N. Y.

Bucyrus-Erie Model 10-B dragline, long frames, 1949 model.

Koehring Model 251 dragline, ⅝ yd., 45' boom, GM 3-71 engine, S/N 1609.

Lima Model 34 dragline, 35' boom, ¾ yd., GM 4-71 diesel, 1946 model, S/N 331524.

Link Belt Model LS 51 dragshovel, ½ yd., Waukesha gas engine cambered boom, 1953 model.

Link Belt LS 50 dragshovel, ½ yd., Buda gas engine, S/N 5D1463.

American Model 375 shovel and dragshovel, ¾ yd., S/N G8731.

Quickway truck crane, 4/10 yd., S/N 5039, mounted on 6 x 6.

Barber-Greene 879A finisher, 1952 model (2).

Barber-Greene Model 702 ditcher ladder type.

Barber-Greene Model 774 ditcher, wheel type.

Diamond 66 portable crushing plant 6-71 GM power, 10-36 jaw, 3020 roll, 1952 model.

Pioneer portable jaw crusher, 936 with 4' x 12' screen.

Pioneer portable roll crusher, 4020 with 4' x 12' screen.

THE ZECO COMPANY
2929 University Ave. S.E.
Minneapolis 14, Minn.
FR 1-7971

MISCELLANEOUS EQUIPMENT

Koehring LF24 Longitudinal finisher, for 12' to 16' width. Used only one season. Excellent condition. Loc. Columbus. $3,000.

Koehring 16-E Twin Batch paver, extra water storage, hyd. dump bucket, GM 2-71 diesel engine. Wonderful Condition. Loc. Columbus. $21,185.

6 Euclid 14TDT-36SH six-wheel scrapers, Cummins diesel engines. Good cond., cleaned, painted. Loc. Columbus.

5 Huber-Warco 5D-190 motor graders, R slide moldboard, GM 6-71 diesel power. Loc. Columbus, Ohio.

2 IHC T-9 gasoline engines. Both overhauled. Good shape. Loc. Columbus.

2 Cleaver-Brooks 28-hp 2-car tank car heaters, gasoline engine power, trailer mtd. Loc. Cincinnati, Ohio.

Austin-Western model 40 sweeper, 39" rt. hand gutter broom, 60" pick-up broom, 2 yard hopper capacity, reconditioned with new parts. Loc. Columbus. $3,500.

Cat D6 crawler tractor #9U20133, with hyd. bulldozer blade. Good condition. Loc. Cleveland.

Cat D7 crawler tractor #3T-25780, with cable bulldozer blade. Very good shape. Loc. Cincinnati.

Pictures and/or complete description available on any item.

THE W. W. WILLIAMS CO.
835 Goodale Blvd. Columbus 12, Ohio
Phone: CApital 8-6651

MISCELLANEOUS EQUIPMENT

LeTourneau-Westinghouse Model "B" Tournapulls equipped with Allison Torqmatic transmissions, powered with Cummins Model NRTO-6-BI Diesel engines, 18 to 20 cubic yard BM-2 Model "B" FULLPAK 32½ ton rated load scraper, cab and lights, 27.00 x 33 tires. Very good condition and priced to sell.

Call or write for details. Inspect at Milwaukee location.

J. P. WAITE, INC.
3304 W. Pierce St. Milwaukee, Wis.
EV 4-1900

Asphalt Plant & Equipment

Model 847 Barber Greene continuous mix portable asphalt plant new in December, 1958. Capacity 170 tons per hour including one Cleaver Brooks oil heater, one like new B. G. 879 asphalt finisher, two 10,000-gallon insulated asphalt tanks, one 8,000 gallon fuel tank, one 1958 10-ton Buffalo-Springfield roller, one generator set. This complete plant set up with piping and other misc. equipment priced at $127,500. Located 10 miles west of Stanfield, Ariz.

Call Wire Write

J. P. WAITE, INC.
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EVergreen 4-1900

Inventory Clearance

51-B BUCYRUS-ERIE new lower track roller assembly (269350AA). List $120. Price $30 ea. (lots of 10).

AGGREGATE EQUIPMENT & SUPPLY CO.
811 Lehmann Bldg. Peoria, Ill.

Model 320 Cleveland wheel trencher. Like new condition. Two sets of buckets. Used very little. Call or write for more data or photos. Bargain.

J. P. WAITE, INC.
3304 W. Pierce St. Milwaukee, Wis.
EV 4-1900

1—Bucyrus-Erie 22-T well drill, Serial #53002.
1 Bucyrus-Erie 29-T well drill, Serial #14482.
Both electric driven.
Will sell either one, but not both.

Waukesha Lime & Stone Co.
Waukesha, Wis.

EXCAVATORS
Increase Your Income

Convert your spare time into steady income selling most popular line of belts and buckles with customer's personal initials, first name or nickname with miniature replicas of actual clams, shovels, draglines, backhoes, scrapers, bulldozers, graders, heavy dirt removers, etc., beautifully enameled also lapels, tie clasps, key chains, money clips, and cuff links. Excellent repeat business. We furnish you with refundable complete sales kit. Really nice part-time money producing items. For full particulars, write to

HOOK-FAST SPECIALTIES, INC.
Factory—16 Eudora St. P. O. Box 1425-E
Providence, R. I.

EQUIPMENT WANTED

A good used 30' boom with one 15' section or two 10' sections for a MC-4 Lorain truck crane. Distance between 2" eyes is 33½" inside and 38½" on the outside.

PETER REISS CONSTRUCTION CO., INC.
42-15 Crescent St. Long Island City 1, N. Y.

NEW CAT DW20-482 TEAM

HAULS BIG LOADS FAST, INCREASES PRODUCTION

Six-minute cycles on nearly a two-mile round trip hauling 24 bank cu. yd. of slow-loading sand! This is the production from two big Cat DW20G Tractors with new 482 Scrapers speeding road construction on State Highway No. 99 in Marshall County, Oklahoma. The big rigs are owned by the W. D. Jeffrey Construction Company of Fort Smith, Arkansas, contractors on this job.

"The new DW20 and 482 Scraper have a faster cycle and loading time which means higher production," comments Superintendent "Smoky" Branson. He adds, "Down time on equipment is minimum."

The DW20's 345 HP results in 12% increase in rimpull over the former model. This provides up to 20% faster travel speeds under similar haul road conditions. The 482 Scraper is teamed with the DW20 for high production with its 24 cu. yd. struck load capacity (34 cu. yd. heaped). On this job the DW20-482 combination loaded in .93 minute.

Field reports from contractors all over the country confirm the productive efficiency of the big DW20-482 combination. Get the facts from your Caterpillar Dealer. He can prove—right on your job—that economical, high production is built into the new DW20 and 482.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

CATERPILLAR

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PICK THE DW20-482 TO BREAK PRODUCTION RECORDS

New Trade Literature

Subject: **Dump Trailers**

Content: Light, medium and heavy-duty trailers tailor-made to fit specific hauling applications are featured in a new Hercules booklet called *Profitable Payloads*. Among the single and tandem-axle models shown are steel and aluminum units of both frameless and frame-type design. Dump trailer bodies described and illustrated include models ranging from 16 to 30 feet in length and from 10 to 25 cubic yards in capacity, plus self-powered units and special models custom-designed to meet special hauling and dumping requirements. Among the many equipment options covered are a variety of metal gauges —in either corrugated or smooth sides and floors.

Where to get: Hercules Steel Products Co., Department EE, Galion, Ohio.

Subject: **Highway Engineering**

Content: *Highway Engineering Handbook* is the title of a new 1,696-page text on highway engineering practice covering the entire field from financing, planning, and traffic operations to design, construction, maintenance and landscaping. In 28 sections prepared by 47 leading authorities, it treats such topics as route selection and layout; finance and administration; soil mechanics, testing and highway materials; basic highway design; rigid and flexible pavements; and other important areas of the subject. The book is designed so that all information is easy to find; the discussions are well illustrated and up to date. There are 452 illustrations and 260 tables. Editor-in-Chief Kenneth B. Woods is widely known as a consultant on highway design and related problems. He has been head of the school of Civil Engineering at Purdue University since 1954. Associate Editors Donald S. Berry and William H. Goetz are, respectively, professor of civil engineering at Northwestern University and professor of highway engineering at Purdue University. Book price is $25.

Where to get: McGraw-Hill Book Information Service, Department EE, 327 West 41st St., New York 36, N. Y.

Subject: **Wagon Crane**

Content: A 12-page catalog gives full details about the newly improved 15-ton Unit model 357 Mobile Crane, which can be converted to a ⅝-yd. clamshell or dragline. One engine powers all functions, and one man controls and operates the self-propelled, rubber-tired machine. The Unit-built carrier for the crane has telescopic outriggers; hydraulic power steering; one-piece turntable gear and roller path; hook rollers; and powerful air brakes on all wheels.

Where to get: Unit Crane & Shovel Corp., Department EE, Milwaukee, Wis.

Subject: **Welding Case Histories**

Content: An 8-page folder describes successful applications of McKay welding electrodes and wires. One application is the construction of a shovel dipperstick for extra-heavy duty in quarrying operations. Another application tells how a manufacturer of dragline buckets cut production costs by adopting semi-automatic welding. Ask for bulletin No. A-1.

Where to get: Electrode Div., McKay Co., Department EE, 1005 Liberty Ave., Pittsburgh 22, Pa.

Subject: **3-Yd. Excavator**

Content: An 8-page catalog presents engineering features of the Manitowoc 3-yd. model 3600 shovel, which is convertible to trench hoe, dragline, crane and clamshell. Full specifications are listed.

Where to get: Manitowoc distributors or Manitowoc Engineering Corp., Department EE, Manitowoc, Wis.

Subject: **Pile Hammers**

Content: An 8-page bulletin lists the complete line of McKiernan-Terry diesel pile hammers. A new addition to the line is specially featured. This model is the DE-40—a 4,000-lb. ram, 24,000 foot-pound per blow diesel hammer. Full information is given covering the operational features of the hammers; description of the operating cycle; design features; specifications; drive caps available; and engineering data covering the energy rating and static load bearing capacities of the hammers. Ask for bulletin No. 674.

Where to get: McKiernan-Terry Corp., Department EE, Dover, N. J.

Subject: **Electronic Batch Controls**

Content: An 8-page catalog describes Johnson electronic controls for remote-control batching. Johnson is a division of Koehring Co. The catalog tells how the operator can set the controls for automatic batching of from ½ to 6 yards of any one of a number of pre-set mixes, then keep track of batching process by means of signal lights on his control panel without having to look at plant. Auxiliary controls for installation on the batch floor and at the batcher discharge gates are explained. Ask for catalog KJ-685.

Where to get: C. S. Johnson Co., Department EE, P. O. Box 71, Champaign, Ill., or Stockton, Calif.

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213-A

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